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Equipment for Carbonizing Purposes

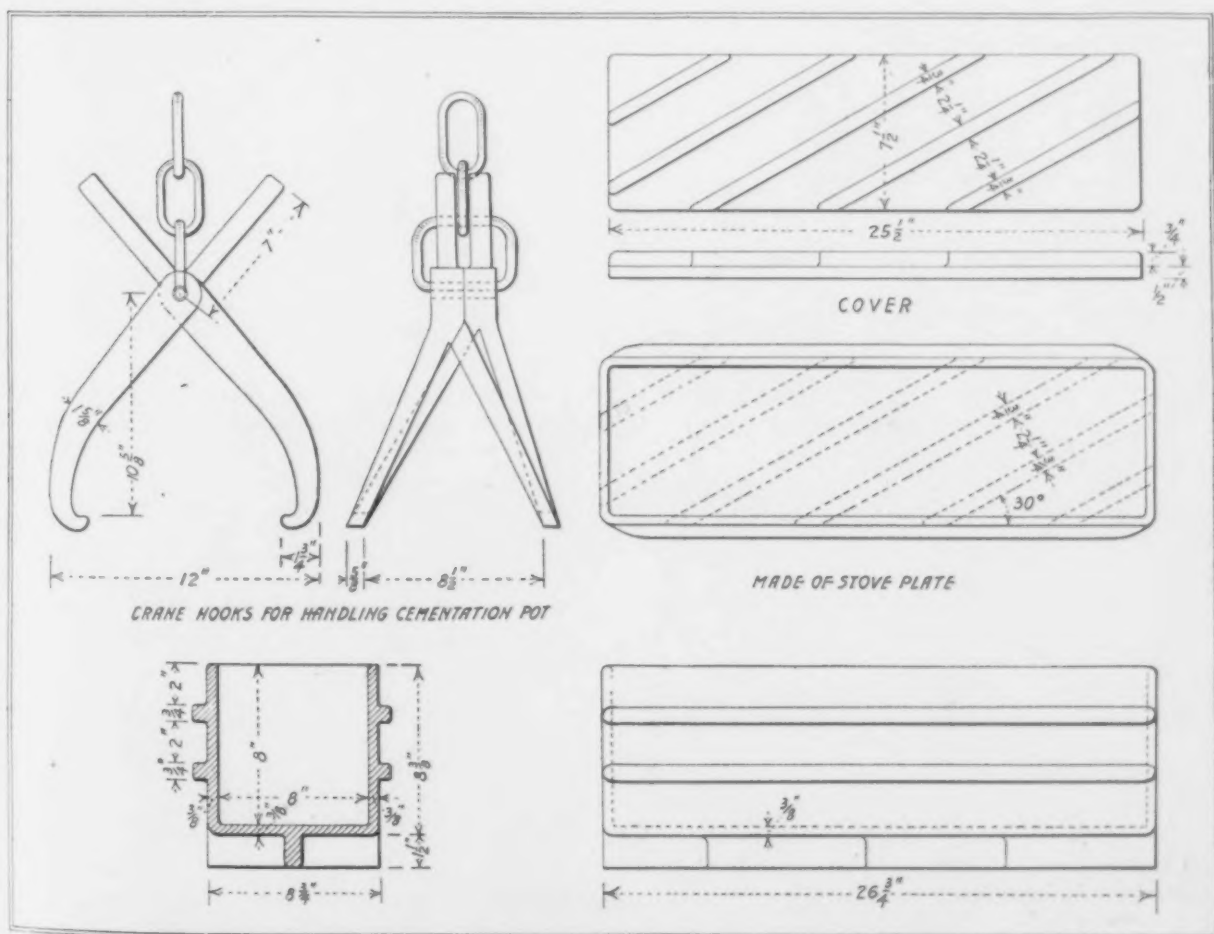
Special Form of Boxes to Contain the Parts to Be Treated—Arrangement of a Recently Constructed Cementation Plant

SOME details of a recent reconstruction and rearrangement of a cementation plant for a car-building works have been obtained from Frederic Schreiber, a consulting industrial engineer of Belgium, who has been practising in this country since the German occupation of Belgium forced him to come to the United States. The accompanying drawings will serve largely by way of description, but the following notes may be added.

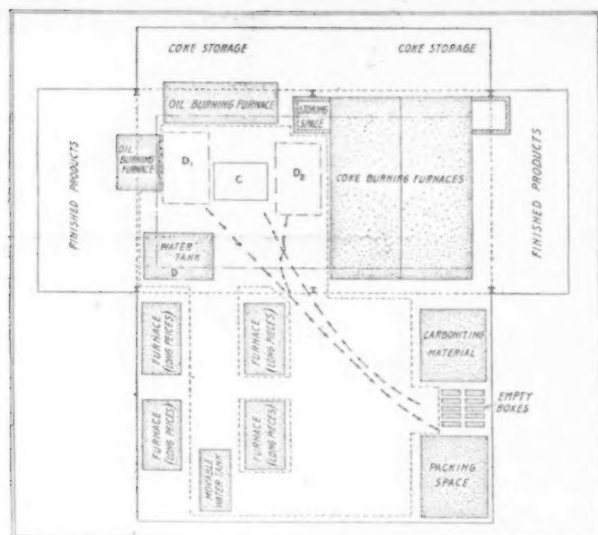
The main feature is the design of the cementation pots, which are made of stove plate. They have an arrangement of ribs on the outside so that they may be stacked closely together and yet provide flues for the passage all around the pots of the products of combustion. This applies to the tops of the pots as well as the bottom. As indicated in the drawings, the channels formed in the bottom and

tops are arranged diagonally with respect to the general dimensions. This favors the movement of the gases from end to end and at the same time gives direction to the flow of gas that is calculated to prevent the so-called channeling action within the furnace. The stacking of the boxes is, of course, facilitated with a resultant conservation of furnace space.

The ribs on the sides of the pots are utilized also for handling. A special form of crane hook is shown among the drawings. Hung from a crane, it is utilized after the fashion of ice tongs, but with two carrying points on each side. While the standard size of these cementation boxes is 8 x 8 x 26 in., a longer and deeper type of box for long pieces is provided, this being still 8 in. in width, but having a length of 7 ft. inside. The reinforcing of the



The Cementation Box and Crane Hook for Handling It



Arrangement of the Case-Hardening Department

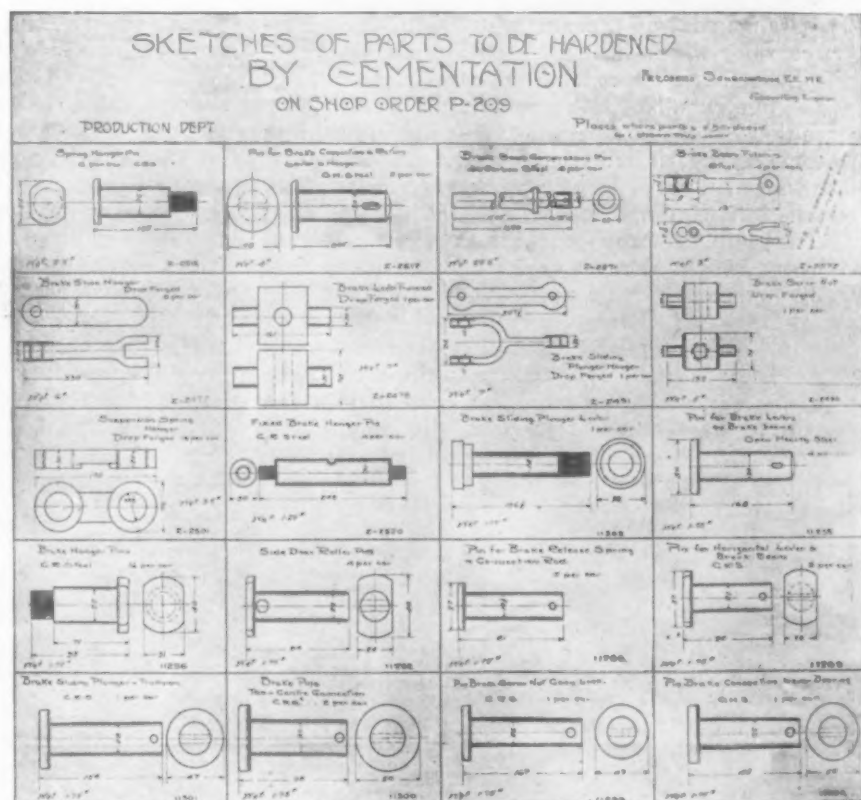
sides, forming also the gas passages, is shown in one of the drawings.

In laying out the cementation plant itself, use was made of three old oil-burning furnaces which were rebuilt, two of them constituting a double furnace. Two large coke burning furnaces were also built. The latter are constructed with an air space inclosed in the walls, simulating the thermos bottle with its advantage in the reduction of the heat losses through the non-conducting quality of the confined rarefied air.

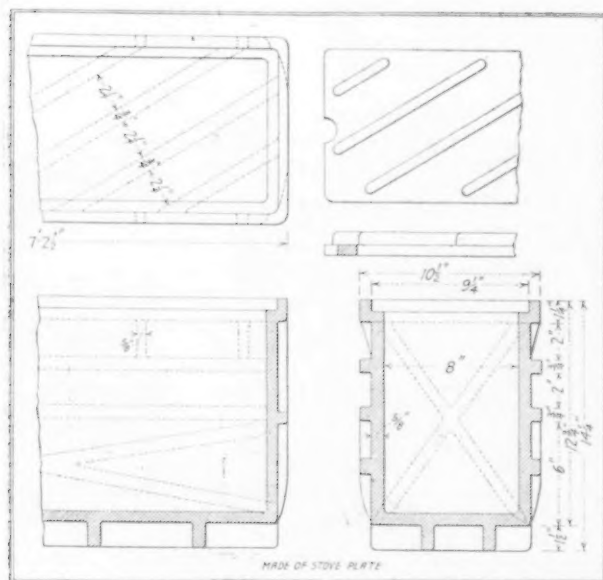
The sketch of the plan of the building shows where parts to be case hardened are piled and where the carbonizing material is stored. In between are stacked the empty carbonizing pots. As they are filled they are carried on trucks to a central

point with respect to the furnaces and there piled awaiting their turn in the furnace. As the boxes are to be removed from the furnace, a water-quenching tank, mounted on wheels, is moved to a convenient position near the furnace and the contents of the pots dumped into a wire basket and immersed in the water. The empty pots are then again returned to the filling space. The cooled carbonized articles go into the adjoining storage spaces and the carbonizing material may be removed from time to time from the tanks and dried for use again. In this particular plant the material used is known as pearlite and is used over and over until it has assumed the form of dust.

Each of the larger furnaces has space for 81 pots or boxes, the larger oil burning furnace takes 12 boxes and the small one 6, a total capacity of 180. In regular procedure the furnaces are charged twice daily, which would give a capacity of 360 boxes per day. The plant was laid out to take care of some 3000 parts per day, requiring 219 pots. Thus con-



Parts to be Hardened Are Marked



Cementation Box for Long Pieces

siderable latitude exists between requirements and furnace capacity. The arrangement for the long pieces, comprising four furnaces and an independent water tank, is shown in the sketch.

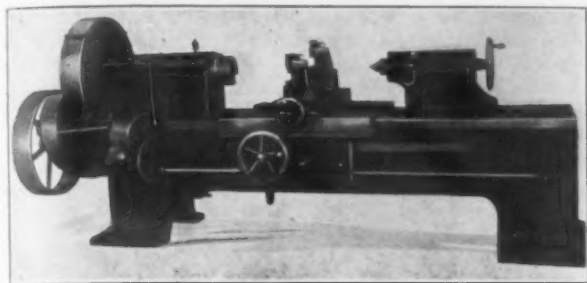
One of the illustrations is a reproduction of a part of a blue print which is supplied to the cementation department. It is calculated to give quickly the information concerning the part of each article which is to be carbonized and therefore the parts of these articles which must be protected against the influence of the carbonizing material.

The Lake Erie Forge & Machine Company, Cleveland, has been incorporated with a capital stock of \$30,000, to succeed the Lake Erie Forging Company. The company's stock has been increased to take care of the growing business, but no plant extensions are planned.

Improvements at the plant of the Penn Steel & Iron Company, Lancaster, Pa., will enable the company to increase its working force. The old puddle and heating furnaces are being torn down and improved ones built. New boilers will be installed.

Shell Turning and Washing Machines

A line of heavy-duty lathes for shell turning and a special machine for cleansing the shells of chips, etc., have been developed by the Pottstown Machine Company, Pottstown. The lathes are built in three different sizes for shells ranging from 3 to 12 in. in diameter and



A Heavy-Duty Lathe with Two Toolposts Designed Primarily for Turning 12-In. Shells, but Also Capable of Being Used for the Rough Turning of Heavy Forgings

the washing machine is made for shells having diameters of 220 and 270 mm. respectively.

The washing machine consists essentially of a tank containing the cleansing fluid, a six-armed spider on which the shells are hung and an apparatus for revolving the spider. Each arm of the spider has a cradle the size of which is varied according to the shell that is being washed. This spider dips into a solution of hot soda water which comes within 3 in. of the top of the tank, the heat being supplied by a steam pipe projecting from one corner of the tank.

The shells to be washed are placed in the cradle by the cantilever crane. After the shell is placed in the cradle it slides along a bar as the spider rotates, being tipped as it drops into the water to bring the mouth upward and allow the air to escape and the shell to fill with water. After the shell has traveled downward for about 1 ft., it tips back so that the mouth points toward the bottom of the tank, thus allowing the chips, etc., to fall out, while a further cleansing is given by a steam jet. As the shell emerges from the water, it points downward to facilitate draining and by the time it arrives at the unloading station the heat has thoroughly dried it. The cantilever crane is again brought into use to remove the shell to the table.

A motor having a capacity of $1\frac{1}{2}$ to 2 hp. drives the washing machine, the starting and stopping being controlled by a shaft located directly in back of the crane and coming through the hollow shaft of the spider. A trip motion is provided which causes the spider to move through one-sixth of a complete revolution and stop,

thus enabling a shell to be removed and another placed in the cradle. This machine, which has a capacity of 2000 shells 6 in. in diameter per day and from 800 to 1000 of the larger sizes, is sunk into the ground so that the loading station is approximately 30 in. from the floor.

The lathe, which is designed for 12-in. shells, is provided with two tool posts and it is pointed out can also be used as a single-purpose machine as well as for the rough turning of forgings. The swing over the bed is 24 in. and the maximum length of work that can be accommodated is 57 in. The lathe is belt driven, the diameter of the driving pulley being 28 in., while the face width is 6 in.

War Prices for German Ore and Steel

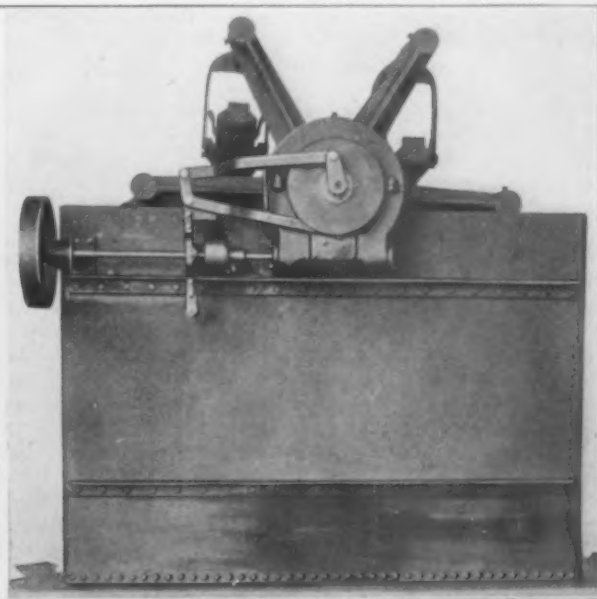
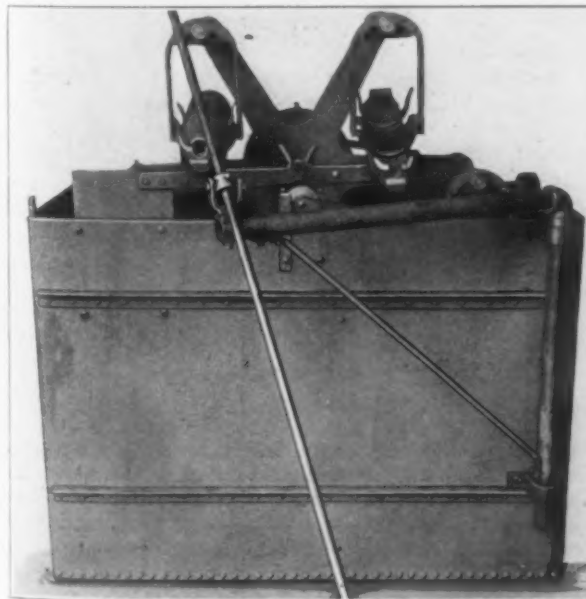
The extent to which the war has affected the prices of materials in the German iron and steel industry is indicated by the subjoined analysis, published by *Engineering*, London. Prices are marks per ton:

Period	Pig Iron, Ore Quality	Iron Middling	Bill-Shapes	Bar Iron
Third quarter, 1914.....	12.60	69.0	82.5	110 94 to 97
Fourth quarter, 1914.....	12.80	74.0	90.0	110 94 to 97
First quarter, 1915.....	12.80	74.0	90.0	110 94 to 97
Second quarter, 1915.....	14.20	81.0	97.5	120 135 to 140
Third quarter, 1915.....	15.60	88.5	102.5	130 140 to 145
Fourth quarter, 1915.....	16.30	88.5	102.5	130 140 to 155
First quarter, 1916.....	16.30	88.5	102.5	140 140 to 160
Second quarter, 1916.....	17.00	93.5	107.5	140 180 to 195

Raw material and unfinished steel rose more moderately than the finished materials. The most important advance in steel quotations took effect only after the end of the business year 1915-16. Despite this most of the companies showed brilliant balance sheets for the year. The sales of the German Steel Works Union amounted to only 3,200,000 tons out of an aggregate steel production of 14,750,000 tons.

Fifty Colleges Offer Men for Technical Service

The services of many thousand alumni of specialized training, representing 50 of the leading universities, colleges, and technical schools throughout the country, have been tendered to the Government by Dr. William McClellan, director of the Intercollegiate Intelligence Bureau, organized in Washington several weeks ago. Dr. McClellan sent this telegram to President Wilson and the Council of National Defense: "The Intercollegiate Intelligence Bureau advises you that 50 of the largest and most prominent universities, colleges, and technical schools throughout the country are ready to provide the nation with men of specialized training for every need which may arise in your plans for national defense."



The Shells to Be Cleaned of Chips, Dirt, Etc., Are Placed in Cradles on the Spider and Immersed in a Solution of Hot Soda Water, Provision Being Made for Tilting Them in Their Progress to Insure Thorough Draining

PHOSPHORUS IN STEEL

Its Determination by a New Method Using an Ammoniacal Water Solution of Molybdate

BY CHARLES M. JOHNSON*

OWING to the high price of molybdic acid the author decided some months ago to prepare it from the ore for use in the laboratories under his supervision.

Early in the experiments, it occurred to him not to carry the process to the molybdic acid stage. Why not dissolve the ammonium molybdate, which is obtained first in the manufacture, direct in the required ammonia, and then in the nitric acid? It seemed useless and wasteful to obtain ammonium molybdate, drive off its ammonia and then right about face to convert it into ammonium molybdate again as a preparatory step in the concoction of the usual nitric acid solution of ammonium molybdate.

The ammonium molybdate, equivalent to the quantity of molybdic acid used in the usual nitric acid solution of it, was weighed, dissolved in water and the required ammonia, allowing for the ammonia in the ammonium molybdate itself. This solution was poured into the amount of 1.20 nitric acid called for in the formula. A nice clear solution was obtained which did not stay clear very long, but clouded with a white precipitate of molybdic acid. The volume of the precipitate was small, but on filtering out this precipitate the clear filtrate, so obtained, again clouded in a few hours, and so on apparently indefinitely. Many variations of the proportions of acid, water and ammonia were tried, but the clouding invariably resulted.

This failure suggested an attempt to precipitate the phosphorus by adding the ammoniacal water solution of the molybdate to the usual solution of the steel in 1.13 nitric acid. This was tried, but only a partial precipitation resulted, or *none at all*, or, as in some instances, the whole mass set to a yellowish jelly. This pointed to the need of more acid. It was interesting to see in the case of the clear *still acid* solution of the steel, containing the required amount of 50 c.c. of the ammoniacal water solution of the molybdate, the phosphorus begin to precipitate on the addition of more acid. This precipitation became quantitative only when the additional acid was put in.

The next step was to try to dissolve the steel or iron in 1.20 nitric acid instead of 1.13 acid. This gave quantitative and prompt precipitation of the yellow phosphomolybdate.

The Old Method and the New One

The following are the principal details of the old method and the new one. The old method, as practised by the author called for a molybdate solution to be made by dissolving 185 grams of 85 per cent molybdic acid and 2 grams of ignited molybdic acid in 900 c.c. of 0.95 sp. gr. ammonia water and 250 c.c. of water. This solution is then poured slowly into 2700 c.c. of 1.20 nitric acid, cooling the latter frequently to prevent overheating; 50 c.c. were used to precipitate 1.63 grams of the steel sample dissolved in 45 c.c. of 1.13 nitric acid.

The new ammoniacal water solution is made by dissolving 220 grams of ammonium molybdate and 200 grams of ammonium nitrate in 2000 c.c. of water to which have been added 200 c.c. of 1:1 ammonia water (0.90 sp. gr. ammonia water diluted with an equal volume of water). The whole mixture when dissolved is diluted to four liters and filtered, but the filter should not be washed.

The solution of the ammonium molybdate can be effected most conveniently by dividing the same into four 55-gram portions, placing each portion in a separate beaker. Also, 50 grams of ammonium nitrate, 500 c.c. of water and 50 c.c. of the ammonia water are put in each of the four beakers. The contents of the beakers are heated and stirred until all of the white salt is dissolved and nothing remains but some

slimy flocculent matter, if anything is insoluble at all. Rinse the contents of the four beakers into a glass stoppered bottle and dilute to four liters. Mix well by frequently inverting the bottle. The four-liter solution is then filtered, but the filter must not be washed, for if it is washed, in the author's experience, some of the impurities on the filter run through and render the filtered solution turbid. The filtering can be done with slight suction on a paper pulp filter or through a porous filtering crucible. This foregoing scheme gives a beautifully clear solution which remains perfectly clear indefinitely. At least this is true of any solutions that the writer has prepared from ammonium molybdate that he has made.

The 1.20 nitric acid is prepared by mixing 1250 c.c. of the 1.42 sp. gr. c.p. nitric acid with 1950 c.c. of water. This should give 1.20 nitric acid at room temperature of 27.5 deg. C. The 1.13 acid referred to is prepared by mixing 2450 c.c. of water with 700 c.c. of 1.42 nitric acid; 50 c.c. of the clear filtered ammoniacal water solution of the molybdate is used to precipitate the phosphorus in 1.63 grams of steel dissolved in 45 c.c. of the 1.20 nitric acid.

Advantages of the New Method

The advantages of the method are:

The total amount of nitric acid consumed is less than in the old way, even when the 1.13 acid is allowed for. The nitric acid in 50 c.c. of the old acid molybdic solution plus that in the 45 c.c. of 1.13 used to dissolve the steel, when figured to 1.42 bas's, exceeds that contained in the 45 c.c. of 1.20 acid used in the new method to dissolve the steel.

The extra expense of producing molybdic acid from the ore is saved by stopping the process when the ammonium molybdate is obtained.

The simplicity of the preparation of the ammoniacal water solution of the ammonium molybdate as compared to the elaborate method of preparing the acid molybdate solution in nitric acid.

The handling of the acid molybdate is disagreeable, hard on the clothes and fingers of the operator and on table tops. The slightly ammoniacal water solution is harmless in all of these particulars.

As stated the slightly ammoniacal water solution keeps as clear as distilled water once it has been properly filtered, while the acid nitric solution of the molybdate very slowly, but constantly, becomes turbid and therefore its precipitating power is lessening continuously.

Four liters of the ammoniacal water solution can be prepared ready for use in a half day's time.

Tables of Comparative Results of Analyzing Steels When Using the Two Solutions

Sample	Slightly Ammoniacal Water Solution of Molybdate, Phosphorus, Per Cent	Nitric Acid Solution of Ammonium Molybdate, 1 ho pho us, Per Cent
No. 9.....	0.054	0.056
No. 34.....	0.023	0.023
No. 7132.....	0.019	0.018
No. 3622.....	0.056	0.054
No. 1.....	0.013	0.014
No. 2.....	0.058	0.058
No. 4.....	0.042	0.044
No. 5.....	0.052	0.052
No. 70.055.....	0.055	0.052
No. 80.042.....	0.042	0.044
No. x, pig.....	0.736	0.730
No. r, steel.....	0.006	0.004
No. 3641.....	0.050	0.049
No. 34.....	0.025	0.025
No. 39.....	0.058	0.056
Pig iron standard A.....	0.097	0.096

U. S. Government Standards

	U. S. Bureau, Phosphorus Value
Pig iron, D, third set.....	0.602
Pig iron, B6a.....	0.105
Pig iron, D6a.....	0.545
10b steel.....	0.120

The results given in the two tables are not averages, but single determinations just as they were obtained by the operator who did not know the phosphorus values of the samples or standards with which he was working. Averages would give exact agreements.

The office of the William J. Breen Company, pig-iron and coke dealer, was removed on April 1 from 84 State Street, Boston, to 148 State Street.

*The author is chief chemist Crucible Steel Company of America, Pittsburgh, Pa.

Brass Manufacture in a Modern Plant*

Reclaiming Brass Waste with a Riffle Table and Filtering Mill Drainage Practices of Stamford Rolling Mill Plants

BY W. F. FREELAND

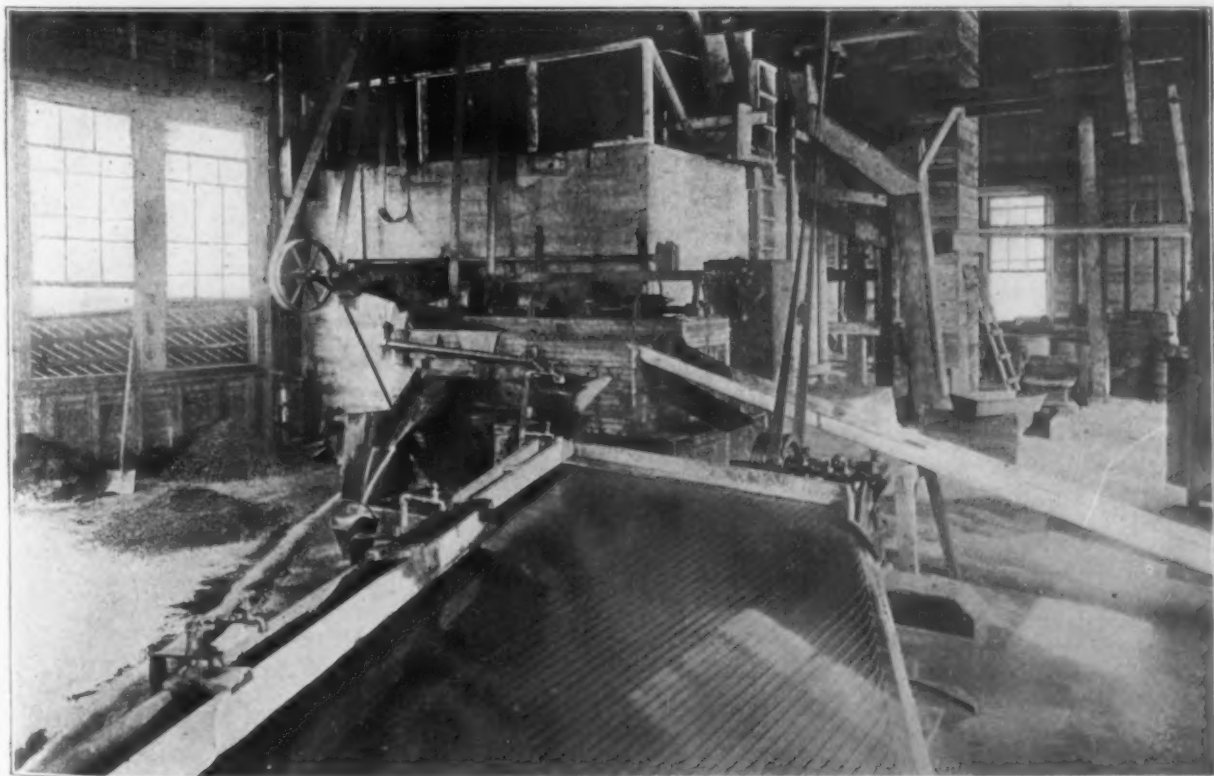
ONE of the most interesting features of the Springdale plant is the brass recovery system. The machinery and apparatus for this work are housed in a separate building. In a pit under the fires in the casting shop is an industrial track and the ashes and skimmings are loaded into a car and run up to the ground level. The car is then run over the yard system of industrial tracks to the recovery building, where its contents are weighed and then dumped into a bucket conveyor, which discharges the ashes, skimmings and sweepings into an elevated hopper from

*Second and concluding part of an article dealing with the plants and practices of the Stamford Rolling Mills Company. The first part appeared in THE IRON AGE, March 29.



The Molds, Arranged on an Industrial Car, Are Poured Directly from the Furnace in Which the Recovered Metal Is Melted

which the cinders are fed by gravity to a revolving screen. The tailings from this are delivered through iron chutes to a picker table, where the cinders are sorted and the large pieces of brass, coal and coke removed. The cinders and clinkers then go to a small jaw crusher, from which they are conveyed to revolving crushers, where the material is ground more finely and again lifted by a bucket conveyor to a rotating sizing screen. The small particles drop through this screen and are conveyed directly to a jigging machine and the large pieces pass out of the end and into the crusher again. From this crusher they are once more lifted to the screen, this cycle con-



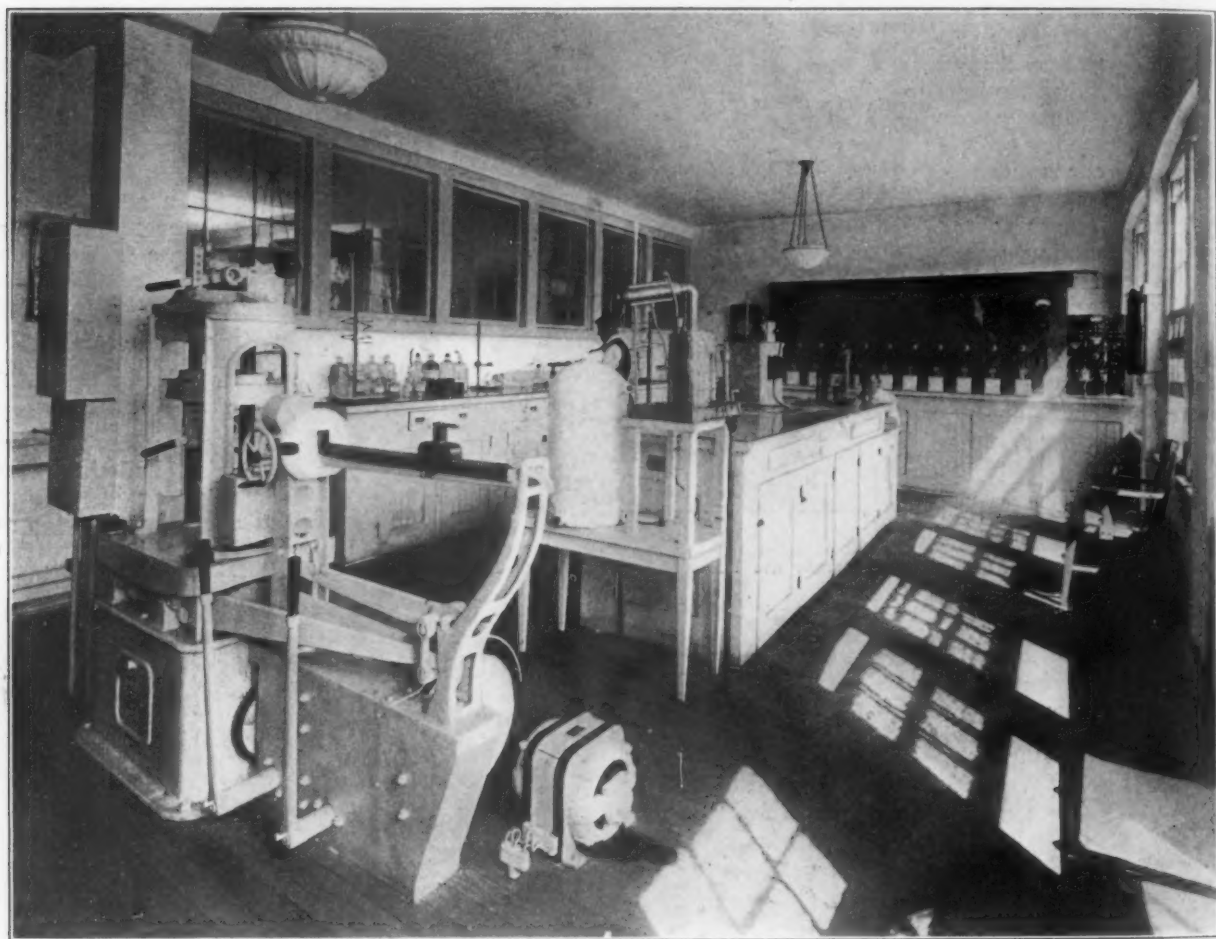
The Vibration of the Riffle Table in the Foreground Causes the Particles of Brass in the Crushed Ashes from the Casting Shop Fires and the Skimmings and Sweepings to Sink to the Bottom and Be Caught in the Riffles, the Lighter or Waste Material Passing Off the Table

tinuing until the pieces are reduced to dimensions which permit them to fall through the screen. After the cinders have been screened, water is mixed with them, just previous to their passing to a four-compartment jig and then to a riffle table. Practically all of the metal is recovered either through the jig or from the riffle table, even to the most minute particles. The recovered metal is next run through a drying machine of the revolving type and then through a magnetic separator which removes any steel or iron which may have become mixed with the brass.

The recovered metal is then carried to an adjoining building, where it is melted and cast into ingot form. On the draw-off side of the furnace is a pit in which is a length of industrial track and a special car arranged to hold a number of molds in a nearly vertical position and placed so that they can

of product. A variation of more than 2 per cent in the proportion of constituents of the mixture or the presence of more than 0.1 per cent of impurities is sufficient to cause the rejection of a cast bar. Rejected bars are either remelted or sold to make an inferior quality of metal. Another important part of the work of the laboratory in the past year has been the checking of chemical and physical analyses of products destined for foreign governments to verify the analyses of chemists assigned to inspection work.

The equipment of the laboratory is complete for the work assigned to it. For physical tests, a 50,000-lb. Riehle testing machine is installed. For making copper and lead analyses, there is a 70-set electrolysis board of a special type and two sets of Veit electro-analysis apparatus. To check annealing furnace temperatures in the mill a pyrometer re-



A 50,000-Lb. Riehle Testing Machine, a 70-Set Electrolysis Board and a Recording Pyrometer with a Selective Switch to Connect It to Any Muffle in the Annealing Department Form Part of the Equipment of the Laboratory

be successively moved directly under the discharge spout. Each heat is analyzed and its contents noted. The ingots are then cut up and used in the casting shop.

Executive Offices and Laboratory

The executive offices of the company are located at the Springdale plant, occupying the space over the shipping room. On this floor, also, are the chemical, physical and metallurgical laboratories, important parts of the scheme of production. The laboratories establish the standards for all raw materials purchased and check incoming shipments by analyses. Each lot of metal cast is drilled and each caster's work is analyzed to check mixtures. This is a most important part of the work and upon its thoroughness and precision depends the reputation of the company for turning out a superior quality

of product. This is equipped with a selective switch so that a record can be made of the temperature of any muffle at will. There is the usual array of chemical apparatus, water stills, electric stoves and ovens and similar equipment. Another section of the laboratory is a metallographic department which has the latest facilities for making photomicrographic studies. The company makes large use of this section of the laboratory to check and correct operating methods and to establish the precise standards made possible by the results of its work and studies.

Other Features of Springdale Plant

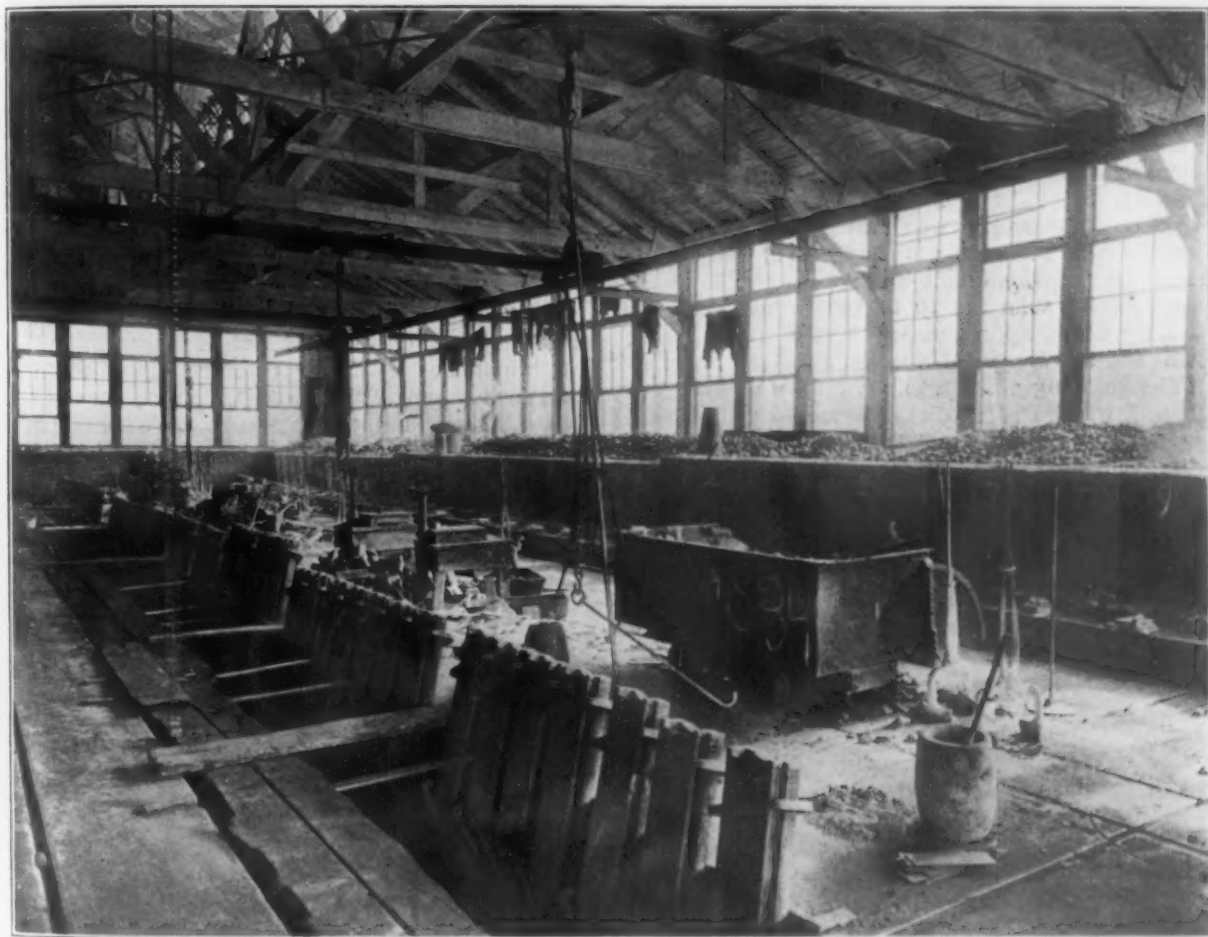
For the proper care of the operatives in the event of accident or illness there is provided a modern hospital department with a trained nurse and attendant always on duty. This department is

equipped with the latest and best outfit for mill work that can be obtained. Although the company has paid much attention to the installation of mechanical safeguards, it is not possible to eliminate those minor injuries which are incidental to brass mill work.

In both plants of the company, considerable attention has been paid to the fire risk, and careful planning has resulted in the placing of hydrant houses and Ajax chemical tanks at strategic points. Water for fire purposes is stored in large tower tanks. The vacuum system of steam heating is employed. A separate building houses two 75-hp. boilers, which are used only for heating purposes. Steam pressure is maintained at 50 to 60 lb. and enters the shop through a reducing valve at a pressure of 1 to 2 lb. There is a blacksmith shop for mill purposes.

A nearby river furnishes facilities for securing an adequate water supply at a small cost. A dam has been built across the river at a point about 200 ft. from the plant, and the water flows through coated cast-iron pipes to a pump that raises it to a 12,000-gal. tower tank, 50 ft. high, which furnishes pressure for mill service. For cleaning the waste water and recovering the oil from it for further use, a filtration plant has been installed.

The general superintendent of the Springdale mill until March 1 was William C. McGrath, who has since been made assistant to the general manager. He entered the brass business in 1903 in the rolling mill department of the Bridgeport Brass Company, Bridgeport, Conn., continuing with that company until June, 1915. For the next year he was active as a consulting and operating engineer in the installation and operation of several brass



The Fires in the Casting Shop Are in Sets of 12 Instead of 10, Which Is the Customary Practice, and the Crucibles Are Set in Rectangular Holes, Lined with Firebrick Just in Front of the Coal Bunkers

The power for operating the plant is purchased from a local generating plant. The energy consumed is in excess of 500,000 kw.-hr. a month. Motors having a capacity of 1500 hp. are installed. All the large machines are equipped with independent motors, and in every case the grouping of drives is arranged, as far as possible, so that any one of the series of machines may be shut down without disarranging the routing of materials. The large rolling mill motors have auto-control boards for stopping and starting as well as reversing switches, controllers, etc. Both lighting and power mains are run in steel conduit, the former leading to one panel board so that the lighting of the mill may be readily controlled from one point. There are about 16 lights to a circuit, four 60-watt nitrogen lamps being placed together in a cluster in a Loring reflector.

foundries and rolling mills. He assumed his present position in July, 1916. Max Wright, who was until recently night superintendent and had previously had a long experience in metal-working industries in Mexico, has been made general superintendent of the No. 1 mill; A. B. Kelsey is assistant superintendent of this mill; Robert Whidden, night superintendent; A. P. Meng, chief chemist; J. W. Blake-man, master mechanic, and J. E. Hedgecock is in charge of the brass recovery plant.

The Stamford Plant

Mill No. 2 is located on Fairfield Avenue in Stamford, and is notable among the plants making copper alloys, as it was designed and built for the special purpose of making cupro-nickel, one of the least known and most difficult to make of all the cupric mixtures. Its chief use at the present time

is for bullet sheathings for small-arms ammunition, but its commercial use in other lines is extending. The writer asked the chief inspector for a foreign government where America stood on the production of this metal, and he replied: "We have had the usual difficulties that one finds in turning out a new product but on the whole are now getting from American producers cupro-nickel of a quality which does not necessitate an excessive amount of rejections. In this particular plant they have overcome practically all difficulties and the standard of quality is very high. It is hardly fair, though, to compare this plant with its special equipment and facilities with the ordinary plant which is making cupro-nickel with brass equipment."

As originally designed, the main rolling mill combined a monitor roof with a sawtooth section on one side. It has been in operation but a few months, but it has already become necessary to add three more sawtooth sections, which give largely increased floor space. There are two casting shops with 48 fires each, and the general arrangement of these shops is the same as in the Springdale plant.

The first breaking-down mill consists of a pair of 20 x 24-in. rolls, driven by a 250-hp. motor. A second breaking-down mill of the same size has only a 150-hp. motor, as it is not used for the heaviest reductions. There are two running-down mills, each a double mill with two stands of 20 x 24-in. rolls driven by individual 200-hp. motors. The usual speeds of the rolls are 90 to 100 ft. per min. for breaking down, approximately 200 ft. for running down and 200 to 225 ft. for the finishing mills.

The finishing mills in this plant are a new product and will be of special interest to rolling mill men. There are eight of these mills with 12½ x 16-in. rolls, arranged in four double sets. The form of mill is quite different from the usual type. Each mill is self-contained, the rolls are driven by 75-hp. motors, the pinions are inclosed and the lubrication is by forced feed. These mills afford great economy of floor space and the arrangement is such that one roller operates two stands. In place of the usual cast-iron spindle and coupling, or wabblers, with its wooden spreader sticks, the spindles in these mills are of forged steel and the coupling is a universal joint which makes a connection between driving pinions and roll necks that is free from backlash. Cut-steel herringbone gears and chilled iron rolls which are water cooled internally are used and the mills are equipped with fully automatic, motor-driven blocking machines.

Other Equipment at Stamford Mill

This mill has three double-chamber muffles of the same under-fired oil-fuel type as are in use at the Springdale plant with a similar arrangement of cooling beds. Besides the pickle tubs located near the cooling beds, there is a set in front of each pair of finishing mills. These tubs are approximately 4 x 20 ft. in size, and around each is a grating covering the pit beneath. These pits have an acid-resisting tile flooring on a concrete base and are arranged with a steep angle to afford drainage. Over each set of tubs is a serving crane and the coils of metal are handled on racks as has been described.

Cupro-nickel is pickled in a special building designed for this product. As is well known by cupro-nickel manufacturers, this product has given considerable trouble in the pickling on account of the solution necessary to obtain the required finish being of such strength that the fumes given off are most objectionable. The company's laboratories have perfected a mixture for cupro-nickel pickling which, while obtaining the proper finish, does not

give off these objectionable fumes. This method enables the company to finish this process in much less time than by the former practice. This building has four sets of pickle tubs served by a traveling crane and a drying-out machine is installed in front of each set of tubs.

The finishing department is similar in equipment to the one in the Springdale mill. A feature of No. 2 mill is the press department which has eight cupping presses and the necessary installation of tumbling barrels and rotary hot-blast drying machines.

Other Buildings at Stamford

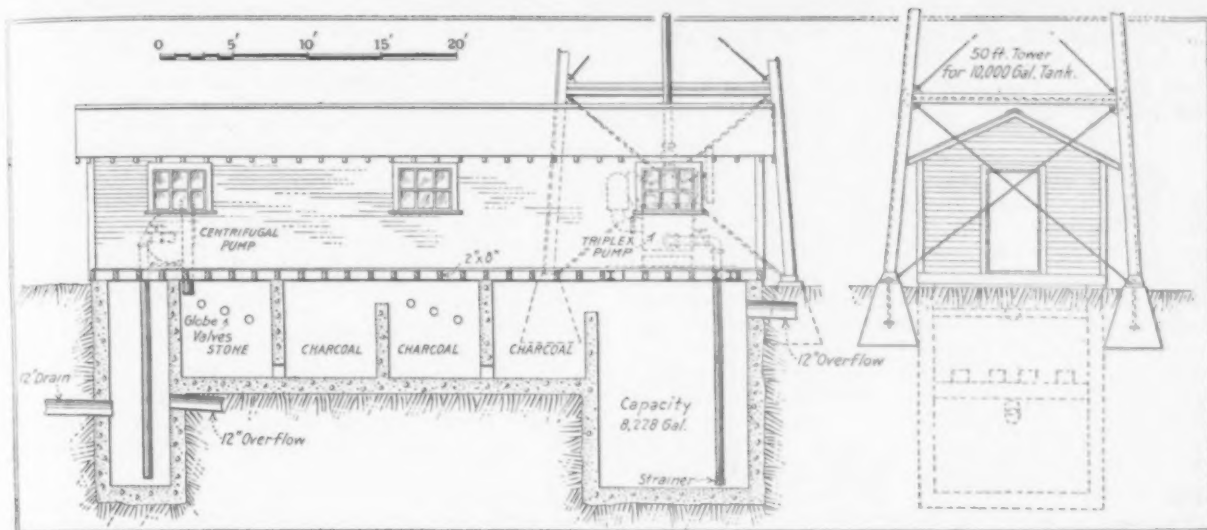
The railroad siding at the Stamford mill is in a cut 18 ft. below the ground level. This necessitates the employment of some interesting facilities for loading and unloading. In the center of the unloading platform, on which an industrial track is laid, is erected a concrete elevator tower so that materials can be unloaded upon the industrial cars which are run on the elevator platform, lifted to the level of the first or second story of the storage building, turned and run off upon the yard system of tracks which serves all parts of the plant. Boxes of finished product are landed by a chute on the loading platform which is near the shipping room. Coal and coke are handled as in the No. 1 plant, except that the bucket elevator has a lift of 75 ft. and the coal is delivered over a space 400 ft. long.

A building which was on the property when purchased has been utilized for office purposes. The machine shop and toolroom are in a separate building, which has a thorough equipment of machine tools for the repair and upkeep of mills, presses and dies. A capacious building near the machine shop has a modern equipment of lockers, toilets and washing facilities for the rolling mill employees. A smaller building adjoining one of the casting shops affords similar conveniences for the casters and their helpers. A boiler house shelters two 75-hp. boilers for heating.

Electric power is purchased to run the machinery and the rated capacity of the motors installed is about 2400 hp. The water supply is furnished from the city mains, the piping system furnishing a combination of mill service and fire line, fed usually from a tank on a 50-ft. tower. A 6-in. city main enters this plant from the street and just outside of the rolling mill is placed a gate valve with an indicator post, this valve having a 2½-in. by-pass to compensate for any loss that may occur in the mill system. On the 4-in. riser to the tank a vertical swinging check valve is placed between the gate valves. In case of fire, the gate valve on the city main is opened, allowing the city pressure of about 60 lb. to come in, thereby overcoming the mill service pressure of about 22 lb. and automatically closing the check valve on the tank riser. In case of failure of the city service, the 25,000 gal. of water stored in the tank and pit become immediately available by the automatic opening of the check valve.

Filtering the Mill Drainage

The water from the pickle tanks is drained to a settling tank quite remote from the mill. The water from the muffle cooling beds and roll pits is led to a filtering plant consisting of two pump pits and four filtering sections. The drains enter the first pump pit, which is 10½ ft. deep, at a point 1 ft. below the pump house floor. At the same level, on the opposite side of the pit, is an overflow pipe. A centrifugal pump carries the water from this pit to the first filtering chamber, which is filled with broken stone. The problem of removing grease and oil from the water is met by installing 2½-in. drain pipes at the



The Mill Drainage Is Filtered to Prevent the Discharge of Objectionable Matter and to Effect Economies in the Use of City Water and the Oil Is Reclaimed for Further Use

water level of two of the chambers as shown. These pipes lead to an oil separator, where the oil is extracted to be used again and the water flows to the second pump pit. The partitions between the several chambers are staggered so that the water flows from the bottom of the first and third chambers and from the top of the second and fourth. The last three chambers are filled with charcoal. The last chamber discharges into a large pump pit, which also has an overflow pipe on the opposite side at the usual water level. From this pit a triplex pump elevates the water to the mill service tank 50 ft. above. This installation has resulted in great economy in the use of city water and in the saving of oil and removes any possible objection against drainage from the plant.

Melville K. Weill is assistant general manager in charge of the Stamford plant. After serving in various capacities in brass foundries and machine shops in this country, he went to Mexico, where for over 20 years he was engaged as a mechanical engineer in mining and rolling mill work with the Consolidated Rolling Mills & Foundry Company, and in the management of iron and stock mills in which he had an interest. F. H. Wilkie is assistant superintendent of the Stamford plant; D. C. Cowling, night superintendent; H. C. Rhéaume, plant engineer, and Edwin Peters, foreman of the casting shops.

The mechanical engineer of both plants is C. O. Evans, who was previously assistant to the mechanical engineer of the Bridgeport Brass Company. Mr. Evans began work in the Coe Brass branch of the American Brass Company, Ansonia, Conn., and has had special opportunities to carry on experimental work in the brass industry. The electrical engineer is Benjamin Offen.

The Stamford Rolling Mills Company has a capital stock of \$2,335,000, of which \$2,000,000 is common stock. The officers of the company are Evans R. Dick, president; Harry Wright, vice-president and general manager; E. C. Potter, vice-president; E. T. Shaw, secretary and treasurer. The directors are Evans R. Dick, Dick Bros., Inc., New York, who directs the financial policy of the company; Harry Wright, who is also president of the Consolidated Rolling Mills & Foundry Company, S. A., Mexico, D. F., Mexico, and has been the man chiefly instrumental in the building up of the present business from the little original German silver plant at Springdale; E. C. Potter, New York, a large real estate operator; A. M. Plyer, Metcalf

Brothers & Co., the well-known woolen house of New York and Rhode Island, and R. M. Tolin, who is also secretary and treasurer of the Consolidated Mills & Foundry Company. H. H. Smock is general auditor in charge of all accounting, E. M. Franklin is production manager, E. T. Cuenin is general purchasing agent and traffic manager, P. F. Head is purchasing agent, and E. K. Wiley is superintendent of stores. The sales office of the company is at 23 Broad Street, New York City, and is in charge of R. M. Tolin.

Book Reviews

Manufacture of Artillery Munitions. By L. P. Alford, F. H. Colvin, Robert Mawson, E. A. Suverkrop and John H. Van Deventer. Pages, xii + 765, 6 x 9 in.; illustrations about 675. Published by McGraw-Hill Book Company, New York. Price \$6.

The book is a reprint of a series of articles which have appeared in the *American Machinist* in the past three years, with some additions. The purpose is "to preserve a record of some of the great work done in the United States and Canadian machine shops in producing munitions for the belligerent nations of Europe."

The selection and placing of machinery in shops and the successive operations and tools and gages required for the manufacture of the common types of British, French and Russian shells, fuses, detonators, primers and cases are profusely illustrated and described. In most cases the time required for each operation is specified, though the manufacturer in calculating costs should not be misled by these figures, which do not take into account the large percentage of rejections due to most exacting limits of dimensions, physical tests and chemical analyses.

A chapter, "Making Shells with Regular Shop Equipment," describes how a bridge shop, with a few extra home-made tools, was transformed into an arsenal. Other chapters describe how parts are produced in shops whose product in times of peace is extremely varied. Only a few firms at present engaged in munitions manufacture realized at the beginning the immense amount of gages and tools required and consequently few placed early orders for sufficient toolroom equipment. Commenting on this condition, in the appendix, the authors state, "after learning from the hard school of experience, it is now realized that toolroom machinery should have been bought during the first period." There is much information which is the result of actual experience in a number of shops that will be of great value to the prospective manufacturer of ammunition and will prevent costly experiments and delays.

As there is a similarity between European and

American ammunition this book will also be found of value to the engineer and tool designer who may soon be called upon to assist in converting their shops into munition factories.

G. F. MATTESON.

A booklet entitled "Protecting Your Factory from Fire," written by Chief William Guerin, has been published by the Pyrene Mfg. Company, New York. The author, formerly organizer of the New York City Fire Prevention Bureau, is chairman of the Fire Prevention Committee of the Safety First Federation of America. He states his object as the desire to show that the prevention of fire is the best and cheapest form of insurance. The book contains chapters on organizing a fire drill and fire brigade and points out the hazards which must be eliminated and the appliances which should be installed. A series of report forms are included which should be used to keep a prevention system efficient. The volume is paper bound, contains 77 pages, 5 x 8 in., and is fully illustrated, principally with Pyrene appliances and utensils. A price of \$1 has been put on the book.

How an employees' association may develop is indicated in what may be called a year book issued by the Barber-Colman Association, an organization of employees of the Barber-Colman Company, Rockford, Ill. The book is an example of the profusely illustrated large-size book in which special attention has been paid to typographical display. While most of the 168 pages are given over to employee activities throughout the year, indicating a large number and variety of athletic and social organizations within the association, it gives some space to the growth of the plant and a description of products, such as the milling cutters and hobbing machines.

"Combustion in the Fuel Bed of Hand-Fired Furnaces" is the title of technical paper No. 137, by Henry Kreisinger and others, issued for general distribution by the Bureau of Mines, Department of the Interior, Washington, D. C. It furnishes data for the design of coal-burning grates and furnaces and their efficient operation and gives light on clinker trouble as related to fusibility of ash and also the possibility of a high rate of gasification of coal in gas producers.

Automobile Parts Consolidation

The Standard Parts Company, Cleveland, which has a capital stock of \$4,000,000, has acquired the Western Spring & Axle Company, with plants at Cincinnati, Carthage and Canton, Ohio; Wheeling, W. Va.; Connersville, Ind.; St. Louis, Mo., and Flint and Pontiac, Mich. This purchase places the Standard Parts Company in the front rank of large manufacturers of automobile parts. The company, which was formerly the Perfection Spring Company, some time ago took over the Standard Welding Company, Cleveland, and recently secured control of the Bock Bearing Company, Toledo, Ohio. It is stated that the steel requirements of the consolidated companies are at least 175,000 tons annually. E. J. Hess, president Western Spring & Axle Company, will become a member of the directorate of Standard Parts Company.

Rapid progress is being made in the remodeling of the Union Street rolling mill, Columbia, Pa., recently acquired by Edward T. Edwards, who is also operating the West End rolling mill. The Union Street mill was formerly used by the Susquehanna Iron Company. Machinery is being installed and early operation is planned.

The Buckeye Machine Company, Lima, Ohio, has moved into its new plant, which includes a machine shop and gray-iron foundry. In addition to its other products, the company will build crude oil burning engines of a semi-Diesel type.

Reinforced Dolomite or Magnesite for Open-Hearth Furnaces

There is evidently a lack of silica brick in France, the French plants not making enough for the national consumption, according to a most interesting and suggestive article by Henri Godfroid in a recent issue of *Revue de Metallurgie*. For this reason Mr. Godfroid publishes the methods he has used with success to replace this material with what he calls reinforced dolomite and magnesite construction.

Its Preparation and Use

All steel makers are familiar with the method of mixing heated tar with dolomite or magnesite, the burned and ground dolomite being carefully mixed with the tar on a clean plate in the proportions of about 15 liters of tar to 100 kg. of refractory material (1.76 pints to 220.4 lb.). This mixture can then be reinforced in two ways:

1. To each five parts by weight of mixture one part by weight of steel turnings is added and the whole thoroughly mixed with a shovel, the turnings to be as spiral as possible, but not of excessive length. The mixture is then used in successive layers 8 to 10 cm. thick and packed into place by iron rammers heated to a red heat.

2. The mixture of dolomite and tar is used in layers 5 to 8 mm. thick, and on each layer about 20 per cent by weight of turnings are spread evenly, then a new layer of mixture and so on until the required shape and thickness is obtained.

In order to make the walls or other parts of any producing apparatus such as an open-hearth furnace, converter or cupola, all that needs to be done is to build the appropriate wooden form so as to give the proper internal shape. The mixture is then rammed into place in successive layers and is reinforced by either of the two ways outlined above. In the case of a furnace, if the arch is made of fire brick there is placed between the arch and the walls a layer of packing paper about 3 mm. thick ($\frac{1}{8}$ in.). When the furnace is finished the hearth is made of the same reinforced mixture but without being rammed into place. Thus prepared the furnace takes a long time to heat up and the first heat is often too cold. It is possible to make, in this way, all kinds of shapes and after being carried to a very high temperature and then cooled they are often stronger and better than silica bricks. The material is molded into shape very similarly to reinforced concrete.

Advantages of This Material

The following advantages may be expected from using this basic reinforced material. First, there is no chance for the bath of metal which is for the most part in contact with basic material being also in contact with acid refractories. Also the dropping of silica bricks into the bath from the walls is prevented, which may happen with old furnaces of the usual construction.

Repairs of broken down parts are easy. By means of a shovel enough of the mixture is thrown on to the part to be repaired, and the material then carried to a temperature near the point of fusion of the turnings. A high temperature is readily obtained because of the large mass of refractory material free from joints, which forms an important reservoir of heat.

An open-hearth furnace has been built by the writer having the back wall, hearth and piers or uprights constructed in this way, which has given full satisfaction. After the first few heats there was splendid regularity of temperature, a minimum time per heat and good purification of the metal. Some heats were made with phosphorus down to 0.010 per cent and sulphur 0.020 per cent, with a carbon 0.55 per cent.

It seems perfectly possible to make arches and ports in this way which will be easy to repair. Also flues and all those parts of a furnace exposed to sufficiently high temperatures. In any case the writer is sure that the so-called laboratory of the furnace can be built entirely of this reinforced dolomite with the certainty of obtaining marked superiority over the ordinary silica brick construction.

G. B. W.

Very Heavy Increase in Federal Taxes

Tentative Plans of Senate Finance Committee Hit Manufacturers—Sharp Discussion at a Hearing—Civil War Experience Recalled

WASHINGTON, April 3, 1917.—The manufacturers of the country, and especially those engaged in the production of war material, will face a very large increase in the Federal taxes they are now paying if plans already foreshadowed by the Senate Finance Committee are carried out. Unlike the Ways and Means Committee of the House, the tenure of which expires with the end of each Congress, the Finance Committee, as an organ of the Senate, is a continuing body. For this reason, its projects carry over from one Congress to another, and on this account the majority members of the committee for many months have given serious thought to the measures it might be necessary to take in the event the United States should become involved in actual hostilities with Germany.

It is possible at this time to quote some very definite statements made within the past 60 days by Chairman Simmons and several of his colleagues on the Finance Committee concerning the taxation of corporations, and especially of munitions makers, in the event of war. These statements are found in a verbatim report recently printed by the committee of a hearing accorded the representative of a large number of manufacturers of war material, steel producers and others who appeared at a special meeting of the committee to oppose the levying of the so-called excess profits tax upon corporations already paying the munitions tax. The corporations represented included the American Steel Foundries, the Federal Pressed Steel Company, the Yale & Towne Mfg. Company, the E. W. Bliss Company, the Driggs-Seabury Ordnance Company, the Smith & Wesson Company, the Colt's Patent Fire Arms Mfg. Company, the Westinghouse Electric & Mfg. Company, E. I. du Pont de Nemours & Co., and others. John Quinn, who presented the protest, urged the committee to consider the transient character of the munitions business, emphasizing the large investments frequently necessary and added that in his opinion "the day of big profits has passed in this country."

Profits in Foreign Countries

"Not if we should become involved with Germany," responded Senator Thomas of Colorado. "War breeds big profits."

"But it is not the experience of England and France," said Mr. Quinn, "that it means big profits to large corporations."

"It was our experience in the Civil War, when Mr. Seward assured the business men of the country that there was no customer like a great nation engaged in an offensive war," said Senator Thomas. "You will have abnormal profits if we are unfortunate enough to become actively involved in the present world-wide conflict."

"We will also have abnormal taxes," retorted Mr. Quinn.

"I think you will," agreed Senator Thomas. "This,"—referring to the proposed excess profits tax—"is only a starter."

"If this country is involved in war," interrupted Chairman Simmons, "probably all the profits anybody makes anywhere and all the income anybody makes will be needed by the Government. Nobody will work for himself if we get into the war."

Mr. Quinn then called the committee's attention to the fact that the munitions manufacturers would not be able to recoup themselves from the excess profits tax by adding the amount to their existing foreign contracts, which he thought would be a hardship.

"We may take your entire plants away from you before we get through," commented Senator Thomas.

"We may regret this tax very much if two months

from now we should unhappily be in war with Germany," said Mr. Quinn.

"We will have to tax you heavily then," replied Chairman Simmons.

"But if there is war," said Mr. Quinn, "the Government of the United States is likely to be the largest purchaser of munitions. I think that ought to lead to a change in the policy of the Government toward munition manufacturers. I think, too, the fact should be remembered that it took courage to go into this business."

"Do you know of anybody who hesitated to go into it if he thought he could get a good contract?" asked Senator Thomas.

Many Risks Taken

"I know a good many who hesitated, and I know some who regret that they went into it," replied Mr. Quinn. "They risked their millions. They had to train their men; they had to get their experts; they were compelled to figure and estimate upon a new kind of business. There were heavy penalties imposed. There were inspections and rejections and so on, and it really was a risky business. There were often large profits, but always very large risks. They are not complaining of that. But the foreign business has largely fallen off. A great deal of it will be ended in the months of March and April of this year, 1917. One of two things will happen. Either those new concerns that now do the foreign business will go out of the munition business entirely, will scrap their plants, or change them into industrial plants pure and simple; or else they will stay in the munition business. I think it is to the interest of our Government that they stay in the munition business."

"All of them?" asked Senator Thomas.

"Yes, Senator, all of them."

"That would be the despair of civilization," said Senator Thomas.

"It is an economic principle," said Mr. Quinn, "that the more concerns you have bidding in a certain business the more competition you will have, and the more favorable prices the Government will get. In many classes of manufacture in England the entire product of one year, that is to say, the annual product of 1915, is now made in one day by the thousands of factories engaged in the work. But it has taken a long time for the British to adjust themselves to the conditions of modern warfare."

"The British Government takes 50 per cent of the profits, does it not?" asked Senator Thomas.

"Yes, Senator, 60 per cent, I am told," replied Mr. Quinn, "but not from the munitions factories alone—of all business."

"We will want half the profits of every one if we go to war with Germany," declared Chairman Simmons.

Senator Simmons's statement was indorsed by all the members of the committee present at the meeting. It is a curious coincidence that in exactly two months from the time when Mr. Quinn suggested that the excess profits tax would be regretted "if unhappily we should be in war with Germany," Congress is meeting for the purpose of deciding that momentous question. Whether the views of the Finance Committee with regard to taxation have changed within the past 60 days remains to be seen.

W. L. C.

A. C. Pessano, president Great Lakes Engineering Works, Detroit, recently announced that his company had booked orders for 29 steel freight vessels, to cost \$16,000,000. Delivery is for 1918. The boats are of the 6000-ton class, 390 to 400 ft. long.

Surface Combustion Used in Galvanizing*

Substitution of Gas-Fired Bath for One Employing Coke in Chapman Steel Company's Plant — Economies in Production

BY WILLIAM J. HARRIS, JR.*

THE use of manufactured gas for heating galvanizing baths seems to have been seldom attempted in the past, and the few installations which have been tried have been unable to compete with coke on a cost basis. The installation at the plant of the Chapman Steel Company, Indianapolis, is particularly interesting, since it practically met the cost of the coke fuel, including actual saving in labor, as well as operating satisfactorily in every particular.

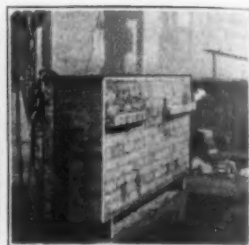
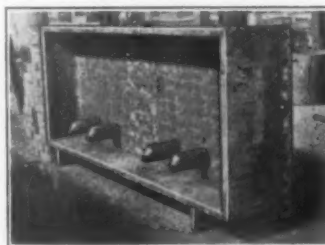
The ordinary type of galvanizing bath is a rectangular riveted or welded steel tank. The dimensions of these tanks, which vary according to the character of the work being handled, range from 2 to 4 ft. in depth, 2 to 6 ft. in width and from 5 to 20 ft. in length. The settling of the so-called dross to the bottom of the tank makes it impossible to apply heat directly, and the customary arrangement is to set the tank on a brick or sand foundation and build a brick setting around it, leaving space for a coke fire between the sides of the tank and the inside of the setting. This space is from 6 to 18 in. wide, according to the amount of heat required, and surrounds the bath on two or four sides, depending upon whether the tank is approximately square or is a long, narrow rectangle.

The coke-fired bath formerly used at the Chapman plant was employed for coating steel sheets of from No. 30 to No. 18 gage from 24 to 48 in. wide and 6 to 12 ft. long. After the sheets have been pickled to remove the scale they are run through the melted zinc by a coating machine consisting of a series of gear-driven steel rollers and a framework immersed in the bath. After leaving the bath the sheets are carried along on an air-cooled conveyor for approximately 100 ft., the operation being a continuous one. This bath, which was 7 ft. square in plan and 44 in. deep, had a capacity of 69,000 lb. of zinc. The output was from 20 to 40 tons per 24-hr. day, using from 6000 to 8000 lb. of zinc.

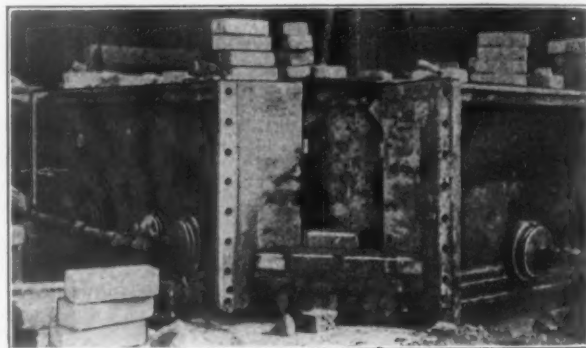
*Engineering department Surface Combustion Company, Long Island City, N. Y.



The Coke-Fired Bath Formerly Employed in Galvanizing



A Section of the Casing for the Gas-Fired Galvanizing Bath with the Burners in Place and Bricked Up Ready for Installation



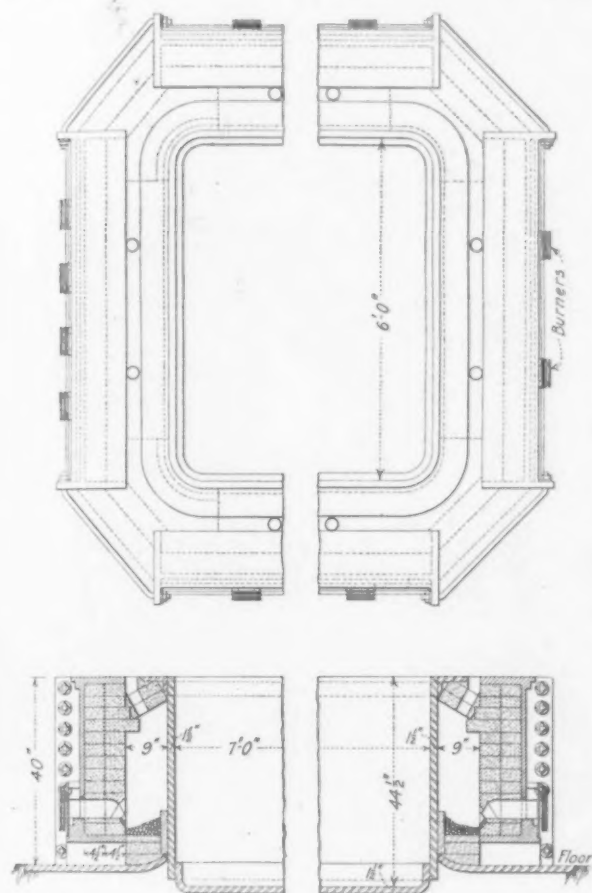
The Regular Corner Pieces Were Removed and the Space between the Side Pieces of the Casing Filled in with Brick

The gas-fired bath is being used for the same kind of work and was originally designed for a coke fire. Instead of using the plain brick setting it has been provided with cast-iron casings which were lined with brick and placed about the steel tank after it had been put in position. This construction was designed to make it possible to renew the tank without having to rebuild the brickwork and was found to be adapted to the installation of the standard impact type of surface combustion burners.

The casing for the original coke-fired bath consisted of four straight sections for the sides and four corner pieces, but as the side sections were set closer to the tank for the gas installation, the corner pieces were abandoned and the space filled in with brick. This bath has a capacity of 60,000 lb. of zinc and measures 6 x 7 ft. in plan, the depth being the same as the one it replaced, 44 in.

The high-pressure gas system was used for heating and operates normally on a maximum gas pressure of 10 lb. per sq. in. and atmospheric air. As the gas was supplied at a 4-lb. pressure, the inspirators A were especially designed to operate at the normal working rate with a pressure of 3 lb., a motor-driven gas booster being installed for use if the service pressure should drop or a higher normal operating pressure be desired. The proportion-

ing of gas and air is entirely automatic without the use of governors or any appliance with moving parts. The temperature control is obtained by a simple adjustment of the gas valve *B*, this being the



Plan and Elevation Partly in Section of the Gas-Fired Galvanizing Bath

only valve on the apparatus and giving a one-valve control. The burners on each of the four sides of the setting are connected to separate inspirators, which are in turn independently connected to the high-pressure gas line *C*. The heat on each side of the bath can thus be regulated independently or any set of burners turned off entirely if desired. The gas pressure at which each inspirator is operating is indicated by a low-reading spring pressure gage *D*, which gives an accurate and convenient means of temperature control as the proportioning of the mixture is automatic and uniform.

If a pressure of 2 lb. is found sufficient to maintain the required temperature at a certain rate of work, these conditions can always be duplicated without guessing at what the burners are doing or may be changed to meet new conditions as they arise. When the bath is not in use the coating machine is withdrawn and the temperature is maintained at about 810 to 820 deg. Fahr. with an hourly gas consumption of 650 cu. ft. At such times the burners on two sides only are used and by closing some of the vents in the brickwork the flue gases are made to circulate around the bath and come out on the sides where the burners are turned off.

The fuel consumption of the

two baths was figured on the basis of coating 30 tons of steel sheets and melting 8000 lb. of zinc per 24-hr. day. To do this required 4000 lb. of coke and the entire time of one man to wheel the fuel from the storage bin and fire the furnace. On the basis of \$5.50 per ton for the coke and 20c. per hr. for labor, the cost was \$16.80 per day. The gas consumption was guaranteed not to exceed 40,000 cu. ft. of gas having a heat value of 600 B. t. u. per 24-hr. day for doing the same work. The cost of this fuel was figured at \$16.40. An actual test made immediately after the installation was completed showed that 28,000 lb. of steel were coated in 12 hr. with 19,000 cu. ft. of gas, the temperature of the bath being maintained at about 840 deg. Fahr. and zinc being added at the rate of 6200 lb.

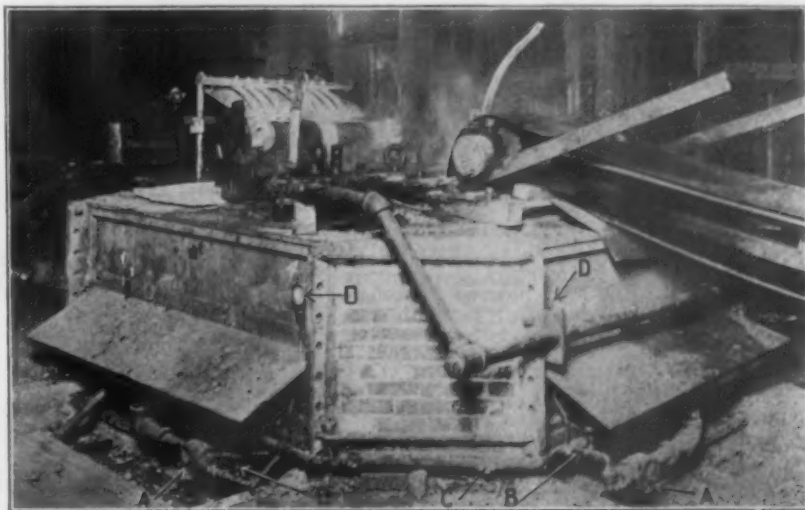
New Engineering Society Organized

At a convention held in El Paso, Texas, on March 8, 9 and 10, the Southwestern Society of Engineers was organized with more than one hundred charter members. Membership is open to civil, mechanical, mining, electrical and chemical engineers and architects and to persons belonging to a technical profession. It is planned to hold at least two conventions of the society each year for the reading and discussion of professional papers and for social intercourse.

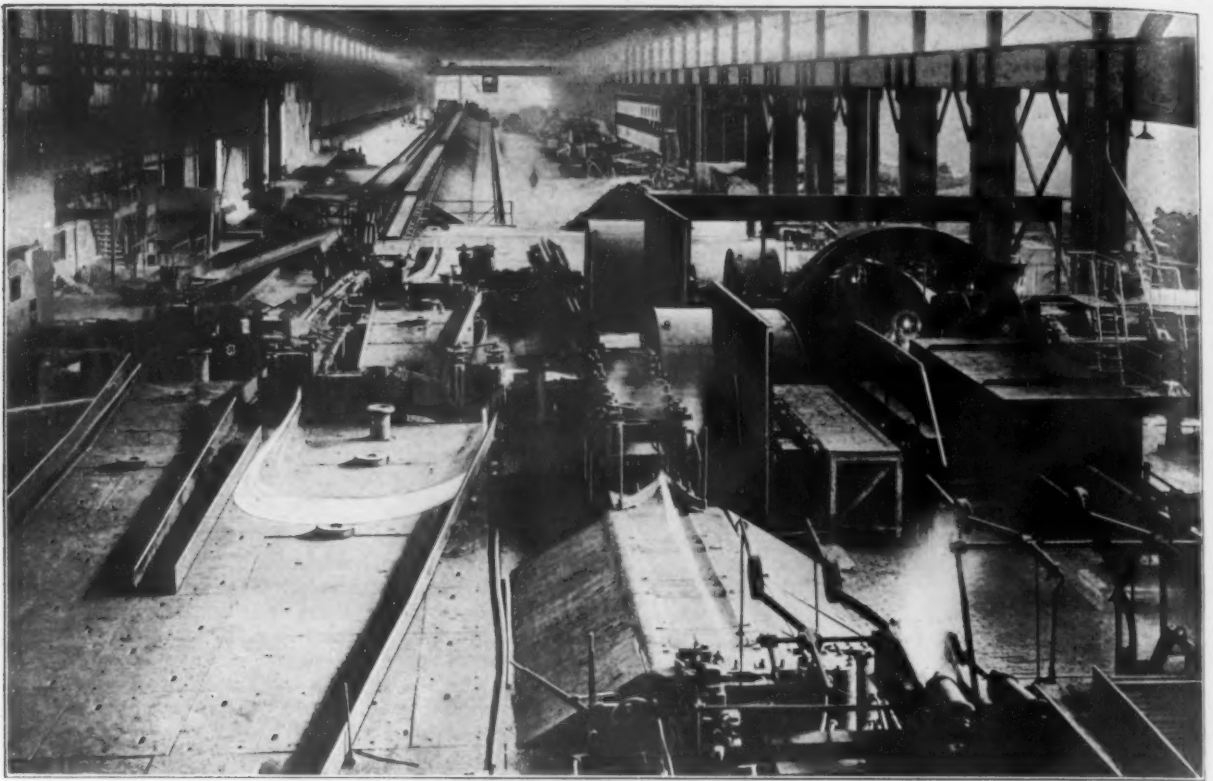
The officers of the society are: President, Dean A. F. Barnes, School of Engineering, New Mexico College of Agriculture and Mechanic Arts. Vice-president for 2 years, Dean G. M. Butler, College of Mines and Engineering, University of Arizona, Tucson. Vice-president for 1 year, Dean S. H. Worrell, Texas College of Mines. Secretary, Forrest E. Baker, El Paso, Texas. Treasurer, R. W. Goddard, professor electrical engineering, New Mexico College of Agriculture and Mechanic Arts. Directors: S. O. Andros, Albuquerque, New Mexico; J. N. Gladding, city engineer, El Paso, Texas; D. B. Gillies, general manager Corrigan, McKinney & Co., Chihuahua; J. C. Ryan, county engineer, Cochise County, Arizona, and W. E. Robertson, El Paso, Texas.

The Charcoal Iron Company of America is reported to have purchased 53,000 acres of land in upper Michigan and northern Wisconsin at a price said to be in the neighborhood of \$1,000,000. A tract of 10,000 acres is located near its Ashland, Wis., plant, and the remainder is situated in Luce and Chippewa counties, near Newberry, Mich.

The employees of the Link-Belt Company, Indianapolis, including heads of departments, gave their first annual banquet at the German House, March 24. They formed an athletic association, which will promote sports and plans to hold monthly meetings.



The Gas-Fired Bath That Was Substituted



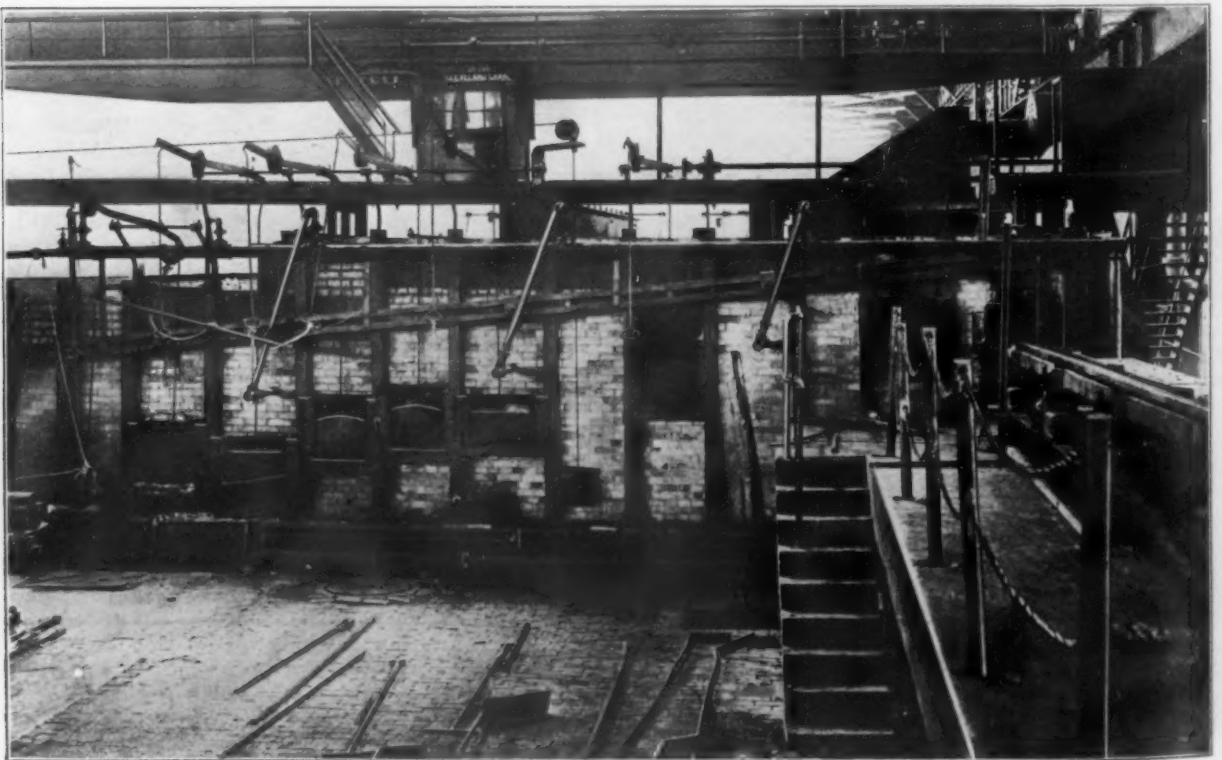
The Mill Looking from the Heating Furnace

New Design Bar Mill at Youngstown

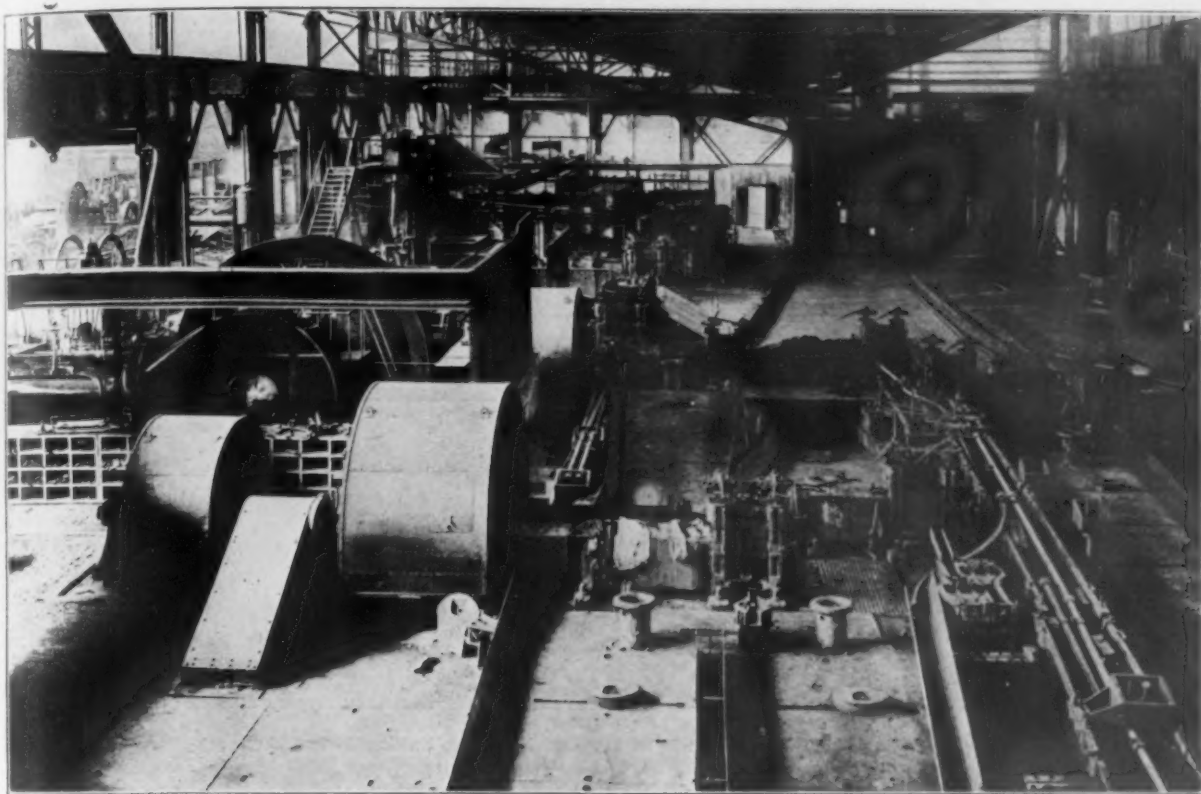
Youngstown Sheet & Tube Company
Starts Its New 9-in. Morgan Mill —
Some Unusual Features in Arrangement

THE new 9-in. merchant bar mill at the Youngstown Sheet & Tube Company's plant at Struthers, Ohio, was placed in operation on Feb. 5 of this year. This mill was built by the Morgan Construction Company, Worcester, Mass., and is de-

signed to take billets of $1\frac{3}{4} \times 1\frac{3}{4}$ -in. to $2\frac{1}{2} \times 2\frac{1}{2}$ -in. sections, in 30-ft. lengths, and reduce them to finished sections of $\frac{1}{4}$ to $\frac{7}{8}$ in. rounds and squares, flats up to $2\frac{1}{2}$ in. wide and angles up to 2×2 in., with a capacity under normal conditions of 6000



Continuous Heating Furnace Utilizes Coke-Oven Gas



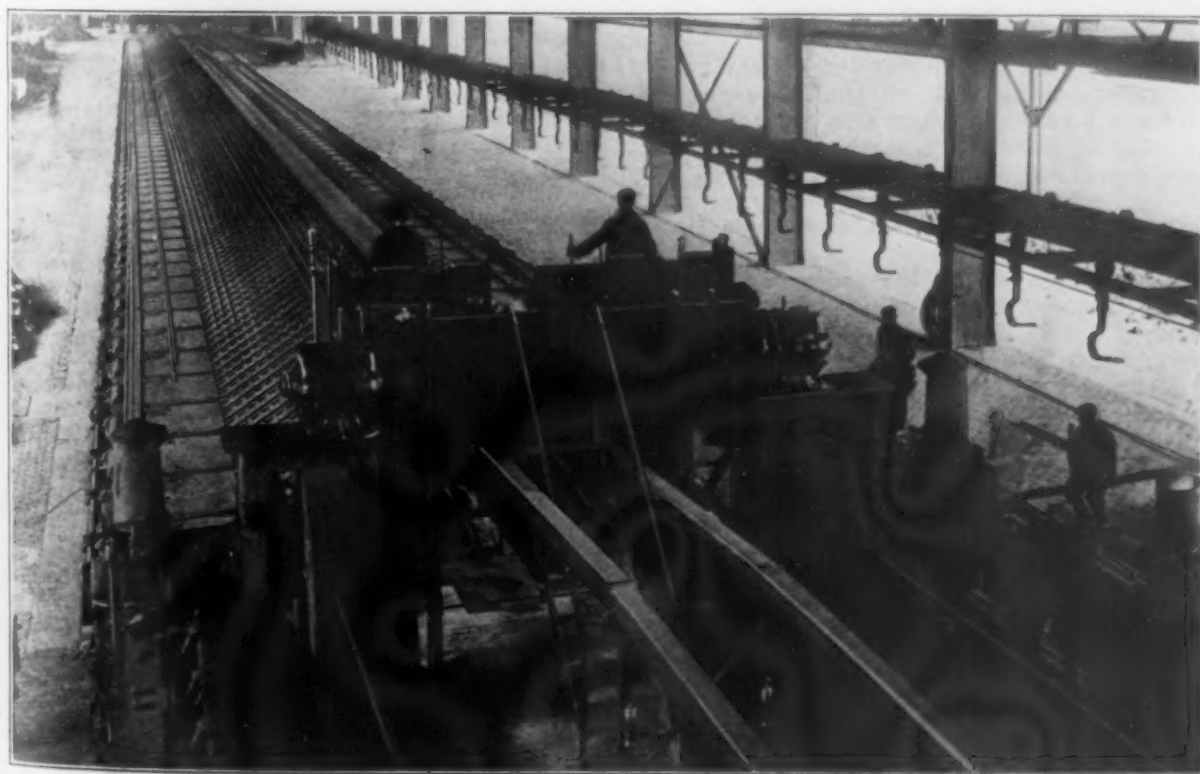
Mill. Looking from the Cooling Bed

tons per month of average sections. Adjoining the 9-in. mill is a 12-in. mill, also built by the Morgan Construction Company, which is now nearing completion and will be placed in operation within the next few months.

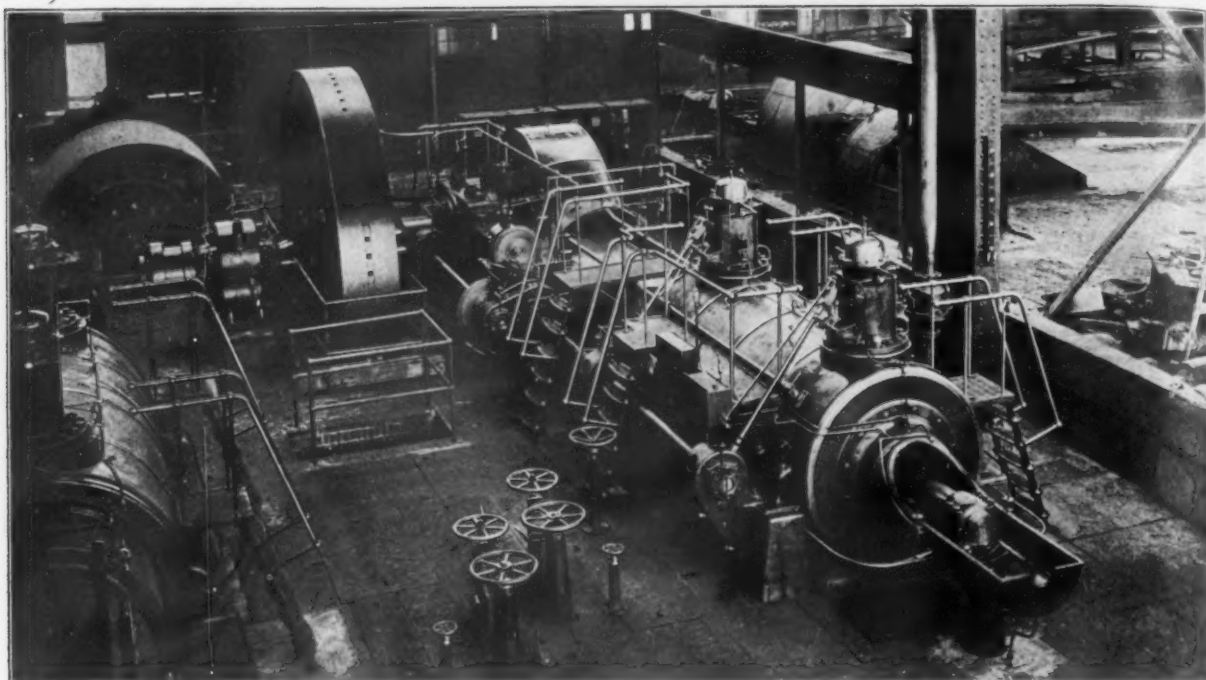
Both the 9-in. and 12-in. mills are served from a common billet yard and use a common warehouse for stocking purposes. The billet yard, at the north end of the mill, is 90 ft. wide and 594 ft. long. It is served by one 15-ton double-hook crane and two standard-gage tracks for unloading material. The warehouse, at the south end, is 100 x 396 ft. in

size, with one 15-ton double-hook crane and four depressed tracks for loading material from stock. The main 9-in. mill building is 90 x 1175 ft., with a 24 x 600-ft. shipping platform on the north side for the storage and shipping of rod bundles. One 15-ton single-hook crane serves the mill, and one 15-ton double-hook crane is used for stock handling. All buildings are of steel construction and, with the exception of the billet yard, have the Pond type of roof, with swinging windows of steel sash and operating device.

A charging conveyor 160 ft. long carries the bil-



The Bar Shear and Double Escapement Cooling Bed



The Roughing Mills Are Driven by a 1500-hp. Nordberg Uniflow Steam Engine

lets from skids in the billet yard to a 25 x 30-ft. Morgan continuous heating furnace, from which they are discharged to the roughing mill by means of a Hawthorne twist pushout. The furnace uses coke-oven gas for fuel, the gas being piped from the Koppers by-product coke plant at East Youngstown.

The roughing mill is a six-stand continuous train of 12-in. rolls, with a steam-operated double-knife dividing shear in front of the No. 1 stand and a 30-ft. side-looping table between No. 2 and No. 3 stands; the shear and looping table are arranged for operating mill either single or double strand. This train is driven by a Nordberg 37 x 48-in. uniflow engine of the poppet-valve type, running from 65 to 110 r.p.m., and developing up to 1500 b.hp. A description of this engine appeared in the issue of THE IRON AGE of July 20, 1916.

The six-stand 9-in. finishing mill is made up of three independent sets of two stands each, placed in a staggered position to one side and in front of the roughing mill. Each set has an independent motor drive, Nos. 7 and 8 stands being driven by a 700-hp. motor at 450 r.p.m., and Nos. 9 and 10 stands and Nos. 11 and 12 stands by 500-hp. motors at 600 r.p.m. The motors were built by the Crocker-Wheeler Company. The bar is repeated into all passes from the last roughing stand to No. 12 finishing stand. Snap shears are provided in front of each of the finishing passes, and small snap shears for test pieces are located in the runout trough to the cooling bed and reels.

The cooling bed, 460 ft. long, is of the Edwards double-escapement type. Located at the end of the bed and on each side are the bar shears, back shear tables and scales, where the material is sheared to desired lengths and weighed before shipping or stocking.

When the mill is rolling rods, or other material that requires coiling, the bar, after leaving the last finishing stand, goes through a motor-driven sizing mill and thence to the rod reels, of which there are four, of the Edwards type, with multiple-disk drive and brake. These reels are belt driven from the finishing mill. The bundles are dumped from the reels directly into a muffled conveyor, which delivers them to a bundle carrier 470 ft. long,

on which they are carried until cool and are then stored on the shipping platform.

Scrap shears and a scrap-bundling machine are located near the mill end and at the side of the cooling bed, while at the south end of the building, near the warehouse, are located the twisting machines for cold-twisting square bars and a roller straightener for straightening shapes.

Electric current for operating the mill is generated at the rod-and-wire power house and distributed to three separate control houses in the mill, within which is located all the control apparatus. From these three control houses all wiring to motors is carried in fiber ducts imbedded in concrete and located beneath the floor. A millwrights' and pipefitters' shop is located within the mill building, and provision has been made for a roll shop at one end of the billet yard. All sanitary equipment, locker and wash rooms have been centralized.

Harrison Brothers Sold to du Pont

Stockholders of Harrison Brothers & Co., Inc., Philadelphia, have accepted an offer by the du Pont Company, Wilmington, Del., and their company is now one of the du Pont subsidiaries. The Harrison business dates from 1793 and the du Pont from 1802, and thus two of the oldest manufacturing concerns in this country have united. The products hitherto turned out by Harrison Brothers will continue to be made by virtually the same organization, with expansion expected, as the du Pont interests will bring to the new organization resources and experience that will increase efficiency.

The Harrison paint and chemical plant, which is on Gray's Ferry Road, Philadelphia, covers 40 acres, and includes a model lead plant with an annual capacity of 10,000 tons. The demand for chemicals since the European war broke out has caused the company to organize the Mantua Chemical Company, whose works are at Paulsboro, N. J., on a tract of 250 acres, and it also owns a plant in Camden, N. J., and a pyrites mine in Virginia. The price paid for the Harrison properties is \$5,700,000 cash, all outstanding obligations being assumed by the purchaser. The business will be continued by a new Pennsylvania corporation to be known as Harrisons, Inc., the incorporators being Lamont du Pont, Dr. Charles L. Reese and Charles A. Mead, of the du Pont Company, and A. R. Clancy and Williams Richter, of Harrison Brothers.

Pencil Electrode Welding of Boilers*

This paper has special reference to the welding of joints of drums and not boiler shells as the latter term is commonly understood. The trend of the times is toward that type of boiler in which all the tubes are bent, particularly in the large units such as those at the Commonwealth Edison Station in Chicago, the Delray Station in Detroit, the Ford automobile factory and the Solvay Process Company. Since the dimensions of the boiler rooms are growing out of all proportion to the size of the engine rooms, much higher pressures will be resorted to to reduce the room required for the boilers. Drums are to be used up to 60 in. in diameter, and in order to bear a pressure of 300 or 500 lb. the thickness of the plate will be very close to 2½ in. There are several methods of making this joint by spot welding, and that which seems to have forged its way to the front is the pencil form of electric welding, which is now fairly generally used in steam boiler work, although as yet recognized only for low pressures. The weld made by this process is not so hard as others of the autogenous kind.

Advantages of Pencil Electrode

In a weld, two pieces of metal heated to the proper temperature are united into one solid piece. Success of the process depends on bringing the pieces of metal to the proper heat. Electricity is used only to supply the heat, and in the pencil method only just enough heat is obtained to accomplish the joining of the two metals. All autogenous welding is accomplished by adding new metal to the joint to be made, and it is only in the pencil electric arc method that positive incorporation of the added metal with the metal to be joined is secured. By the electric pencil method fluidity is avoided and only just enough heat is used to make the plate and the electrode plastic, and there appears also to be an action in it which in the direction of the current tends to pull the metal from the electrode to and into the plate when just at the proper heat. This is so much in evidence that welding can be carried on overhead without the metal dropping upon the operator.

The temperature of the added metal in the gaseous and electric carbon type wherein fluidity is a condition approaches 2800 to 3000 deg. Fahr., while in the electric pencil method the temperature of the metal being added is not more than 1500 deg. Fahr. This point that the temperature of the arc is so high, so hot, that there is danger of the metal becoming vaporized, is answered by the fact that the conditions surrounding this particular form of spot welding are analogous to and the same as for "forge welding" as carried on by the everyday blacksmith at his anvil.

Although the electric heat reaches an estimated temperature of 6500 to 7000 deg. Fahr., in this process the metal wire does not have time to reach this temperature before it is added to the plate or in the usual groove which is to be filled with the welding metal. As fast as the metal wire becomes just plastic, the pencil must be advanced toward the work, or the arc gap will become too long for the electric arc to maintain its circuit. The distance needed for the arc does not amount to much more than 1/8 in., because the voltages used are low, rarely exceeding 60 or 70, and failure on the part of the attendant to maintain this distance by constantly advancing the pencil is met at once by the extinguishing of the arc, because the gap becomes too long for it to maintain itself. Only in this process, carelessness is practically eliminated, both as to overheating and heating any considerable area, and the heated area is confined to the smallest dimensions of any; therefore the expansion and contraction strains are smallest. The wire forming the electrode only gets red hot at the point, showing the very localized character of the heat, the rest of the wire remaining black; while in the carbon form of electric welding, the carbon gets very hot from the point up to the holder.

Results of Tests

Tests have shown that for pressures of 500 lb. per

sq. in., and with plates of 2½ in. or similar thicknesses, this method of welding makes a better joint than straps and rivets. To be sure that a joint so made will be stronger than the plate, and last indefinitely, it is only necessary to keep on adding new metal until the cross-section on both sides amounts to more than the plate itself. This can be carried to extremes, and may as well be, just filling the groove, usually V-shaped, the extra metal to lap over on each side ¾ or ½ in., and made in bulged form, both inside and outside of the drum, taking on the form somewhat of a butt strap joint.

There has just been put into service, with a view of trying it out in actual practice, a small water tube steam boiler of the vertical two-drum type, with all the tubes bent and the drums have not a rivet in them. Heavy tests have been applied, and there is not the slightest doubt that the men who have to do with the erection of this boiler do not anticipate any danger to anyone from it.

Holder for Boring Tools

A new boring tool holder has been placed on the market by the G. H. Scott Machine Company, Cleveland. The principal members of the holder are a body and shank in one piece and a barrel that rotates in the body. The body and shank is cold-rolled steel and the rotating member hardened tool steel. Important advantages claimed for the tool are its compact construction, rigidity and simple adjustment.

The barrel is off-center with the body, and the hole in the barrel in which the tool is held is off-center with the barrel itself. The former is rotated by a handle in a



The Rotation of the Barrel Holding the Tool Provides a Range of Adjustment in This Somewhat Novel Boring Tool Holder

slot that extends about 180 deg. around the circumference of the body. When the handle is at one end of the slot, the tool hole is at a dead center. With a revolution of the barrel about half way around, the hole is ¼ in. off-center, giving a ¼-in. range of adjustment. When the proper adjustment is made, the barrel is locked by a safety set screw, and the boring tool is held in position by another screw located in the slot. Adjustments can be made within as close limits as required by 0.001 in. The graduations permit the use of the holder in boring duplicate holes without having to caliper them individually. The holder is furnished with a ½-in. straight shank, adjustable for either a drilling or milling machine chuck.

The T. L. Smith Company, Milwaukee, is completing work on two of the largest concrete mixing units ever built, for a hydroelectric construction project in the South. Each has a capacity of 108 cu. ft. and weighs 23 tons. The inside diameter of the drum ring is 9 ft. 6 in. The machines are mounted on steel skids, with a large batch hopper supported by a steel frame.

The Oliver Chilled Plow Works, South Bend, Ind., has placed at the disposal of its employees about 50 acres of land to be used for gardening. It will be plowed, harrowed and platted in 200 tracts. The company will furnish an expert truck gardener to assist the employees and will offer prizes for the best gardens.

*Abstract of a paper presented at the recent annual meeting of the American Society of Mechanical Engineers, by E. A. Wildt, Lackawanna Boiler & Grate Company, Scranton.

THE REDUCTION OF FRICTION*

What the Automatic Lubrication of Cylinders and Bearings Will Accomplish

Friction is the resistance produced by two bodies coming in contact in a sliding or rolling motion. The product of this resistance or friction is a rise in temperature. The antidote for friction is the application of a lubricant of the right kind at the right place and in the right quantities. It is the proper valuation of the last three items that gives us the most trouble and usually requires the services of a competent lubrication engineer. In order to give these points brief consideration I will divide lubrication into two parts: first, interior, or cylinder lubrication, which is delivering oil into cylinders and valves against the pressure of the steam, air or gas; and second, bearing lubrication.

Cylinder Lubrication

This problem places us between the two horns of a dilemma. We know that the more oil we use the smaller will be the amount of power consumed by friction, but we know also that most of the oil which is mixed with the steam going into the cylinder passes out with the exhaust and is forever lost. Of course, a certain amount of oil can be removed by separators, etc., but this is usually mixed with so much water, and is so thoroughly emulsified, that it is not suitable for further cylinder lubrication. The object in cylinder lubrication is to secure the highest degree of lubrication with the smallest amount of oil.

Another reason for keeping the amount of oil as low as possible is that it is impractical to remove it from the condensate, and a large proportion of the oil finds its way into the boilers and makes trouble, for oil is quite an efficient heat insulator. William Parker, engineer-in-chief of Lloyd's Registry, found not long ago that by painting an open steel dish with three or four coats of greasy deposit taken from the bottom of a boiler and mixed with cylinder oil, it was possible to burn the dish before the water in it boiled. This might be called a side line of lubrication, but lubrication engineers have to take it into consideration.

Within the memory of the youngest engineer, cylinder lubrication has gone through many changes. First, suet or tallow was injected through a small hole in the cylinder every time the engineer happened to think of it; next, grease cups were used; then came the hydrostatic lubricator, and the last and most important step was the general adoption of the mechanically driven force-feed lubricator.

Most plants have adopted the system of force-feed lubrication for the main power units, but there are many depending upon more or less antiquated methods for supplying cylinder oil to their auxiliaries. As the auxiliaries are usually located in out-of-the-way places where they do not receive as much attention as the main units, automatic lubrication of such machines is of at least as much importance as that of the main units. The amount of power consumed by the auxiliaries, compared with the main units, clearly shows that lubrication of the former must be carefully considered. The areas of the rubbing surfaces of the main units in a large railway power house amount in all to about 1507 sq. ft., while those of the steam and air ends of the auxiliaries, air compressors, vacuum pumps, etc., total about 530 sq. ft. As some of the auxiliaries are automatically started and stopped without supervision, it is evident that they should not only be supplied with a good system of lubrication, but also with one which will start and stop automatically with the machines to which it is attached. The power consumption of auxiliaries is more striking in smaller plants than in large ones. For instance, in the Marble Bridge Building, Thirty-fourth Street and Broadway, New York City, only 50 per cent of the power produced is used by the main generating units, the remainder

being consumed in the auxiliaries. In the power plant of a modern apartment house in New York City two-thirds of the total power is consumed in the main units. These are only a few examples, but there are many plants where, even though the main units are properly lubricated, the cost of lubrication could be greatly reduced and the plant efficiency improved if the auxiliaries were equipped with an efficient system of lubrication.

Bearing Lubrication

The problem of adequately lubricating bearings is entirely different. Economical lubrication requires the installation of modern scientific apparatus which will automatically apply the oil in a manner that will do the most good.

The only economical method of lubricating bearings consists in supplying as much oil as the bearings will take and of collecting, filtering and using it over and over again. In passing through the bearings the oil takes up small pieces of metal removed from the bearings by friction, dust, etc., also water from condensed steam which has leaked past the stuffing boxes. If solid matter and water are properly removed from the oil, it is in a condition to be used over again; therefore, the crux of a good automatic system of lubrication is the filter, wherein the oil is restored to its original pure and clean state.

In the power plant of a shoe factory the engine-room log shows that before the adoption of continuous stream lubrication it was necessary to key up the pins about once every two weeks, whereas since the oiling system was installed keying up is only necessary every six to eight weeks. One of the engines in this plant, a 200-hp. Corliss unit, is equipped with an individual oiling and filtering system, and the make-up oil only amounts to 2 gal. per month. A further illustration of what can be accomplished with a properly designed automatic system of bearing lubrication is furnished by one of the largest public-service plants in the country, where 30,000,000 kw. are generated each month. The total amount of oil consumed for all the main generating units and their auxiliaries amounts to only 300 gal. per month; and in another plant the actual cost of cylinder and bearing lubrication amounts to only 2c. per 1000 kw.-hr.

Designing Lubrication Systems

The requirements of an efficient lubricating system are a stream of clean oil supplied continuously at just the points where needed, a filter which will thoroughly remove all dirt, small particles of metal and entrained water and properly cool the oil, and the system should be automatic in its operation and absolutely reliable. The lubrication engineer has three alternatives to work upon in the design of a scientific system: he may install a central oiling system in which the main supply of oil is stored at one point and conveyed to the bearings of the various power units and auxiliaries by main feed and branch pipes to each machine, or he may make each individual engine, pump, air compressor, etc., a unit by itself, and supply it with its own oiling and filtering system; or he may employ a combination of the two by providing one lubricating system to take care of a group of machines.

In the application of the first system it is necessary to install a large part of the apparatus in duplicate to insure absolutely continued operation of the plant. The amount of duplication depends a good deal upon the arrangement of the plant, the susceptibility of the various parts to injury, the value of continued operation, and also the ideas of the designing engineer.

To insure absolutely reliable lubrication, many plants are now installing individual oiling and filtering systems, so that each unit is equipped entirely independently of all other units in the plant. Practically everything necessary for these individual oiling systems is above the engine-room floor, and therefore always in sight and under the care of the engineer or attendant.

Real bearing lubrication economy is possible only when every bearing is continually supplied with a stream of clean oil so that the rubbing surfaces float

*From a paper presented at a meeting of the Milwaukee section of the American Society of Mechanical Engineers by J. Wm. Petersen, vice-president and general manager, Richardson-Phenix Company, Milwaukee.

past each other on a film of oil instead of coming into metallic contact, reducing cost of producing power; and, when the oil is automatically collected, filtered, purified for use over and over again, reducing cost of attendance and oil.

IMPACT TESTS OF STEEL

Isolated Results Misleading—Their Relation to Other Physical Properties

DISCUSSING "Impact" Tests—Their Relation to Brinell, Tension and Torsion Tests," before the Steel Treating Research Club of Detroit at one of its recent regular meetings, Howard J. Stagg, Jr., metallurgist, Halcomb Steel Company, Syracuse, N. Y., in reviewing the various methods of making impact tests, said that the numerous tests which have been carried out do not appear to indicate a marked superiority in any one of the various methods used in testing notched bars by impact. Hence, no particular one is recommended to the exclusion of any of the others. Each type of machine is championed or used by some investigators, and the arbitrary results recorded. The very fact that no standard has been adopted has rendered the co-relation of existing data extremely difficult and indefinite, and it is indeed almost impossible to translate the figures of one worker into those of another.

How the Impact Tests Were Made

Mr. Stagg's method of making the impact tests on which his results were based was as follows:

In making the impact tests, a pendulum machine having a tip weighing $33\frac{1}{2}$ lb. and falling from a height of 3 ft., developing a blow of 100 foot pounds, was used. One end of the nicked test piece was held tightly in the jaws, with the opposite end projecting free above. The bottom side of the nick was about three or four thousandths of an inch above the gripping jaw with the nick facing the pendulum. The standard test piece adopted by the Society of Automobile Engineers and the American Society for Testing Materials was used. It was 10 mm. square, 40 mm. long, the nick at the center 1 mm. wide, 2 mm. deep, and the bottom cut to a radius of $\frac{1}{2}$ mm. The test pieces were ground to size after treatment.

Taking a chrome-vanadium steel containing 0.48 per cent carbon, 1.26 per cent chromium and 0.18 per cent vanadium with the manganese 0.85 per cent and quenched from an ascending series of temperatures—1450 to 1900 deg. Fahr.—and all drawn at 800 deg. Fahr. for 25 min., Mr. Stagg found that the elastic limit and maximum strength were rather low when quenched at temperatures below 1500 deg. Fahr.; also that the elongation and reduction of area are somewhat higher as the quenching temperature rises. Curves for these values are practically straight lines up to 1800 deg. Fahr. where a slight falling off is noted. The elastic limit and maximum strength of the Brinell hardness curve show little or no deviation.

The impact curve, however, gradually rises until a temperature of 1650-1700 deg. Fahr. is reached. At 1750 deg. Fahr. a marked falling off is noted and at each successive rise in the quenching temperature this falling off becomes more and more evident. At 1900 deg. Fahr. the impact figure has dropped to 7, while at the temperature which is recommended for quenching this material, 1650-1700, it had an impact figure of about 30. In this instance information has been given which both the tensile and hardness figures failed to detect markedly.

Taking a chrome-nickel steel containing 0.27 per cent carbon, 1.31 per cent chromium and 3.42 per cent nickel quenched in oil and also when quenched in water and drawn at a series of ascending temperatures, the author states that the general characteristics of the curves are similar to those of the former steel, but that in this case the impact figures exhibit a more gradual increase. An increasing but greater ability to resist shock as the temperature rises is indicated and

to a greater extent than either the elongation or reduction curves.

An Impact Figure and Corresponding Static Tests

An impact number corresponding to certain physical properties developed by a certain heat treatment in one steel compared with the impact number obtained in a different steel does not usually represent the existence of the same physical properties in the other steel. For example, an impact figure of 42.4 corresponds to an elastic limit of 53,500, maximum strength of 104,000 lb. per sq. in., elongation of 22.5 per cent, reduction of area 48.0 per cent and Brinell hardness of 189, while this same impact figure 42.3, in another set of tests, corresponds to the following physical properties: Elastic limit 172,000, maximum strength 200,000 lb. per sq. in., elongation 16 per cent, reduction of area 56.5 per cent, Brinell number 380. In other words, there seems to be, as Leon and Ludwick say, "no uniform relation existing between static tensile tests and notched bar impact tests."

In the case of a tool steel of 1.03 per cent carbon containing no alloy, quenched in water at increasing temperatures, the small test piece was hardened throughout. The resistance to impact of tool steels which are hardened and not drawn is extremely small. The curve, says Mr. Stagg, shows a straight line at the correct hardening temperatures and decreases perceptibly up to 1550 deg. Fahr. At this temperature a marked and unmistakable change in the slope takes place and the resistance to impact increases. This fact has been established by a series of tests on six different types of tool steels, including those containing vanadium, tungsten, chromium in varying proportions and also in two different carbon contents in each class of tool steel. Why this is true the author says he is unable to state.

In the case of the same tool steel quenched from 1400 deg. Fahr. in water and drawn at successively increasing temperature, the slope of the curve increases with the temperature and indicates one of the reasons why a hardened tool should have its temper drawn. It is curious to note the change in the slope at the transition point between file hardness and file softness—400 to 500 deg. Fahr.—denoting an increased ability for resistance to impact upon becoming softer.

Discussing another set of tests, Mr. Stagg says that there seems to be no fixed ratio between either the elongation or reduction and degrees twist per inch.

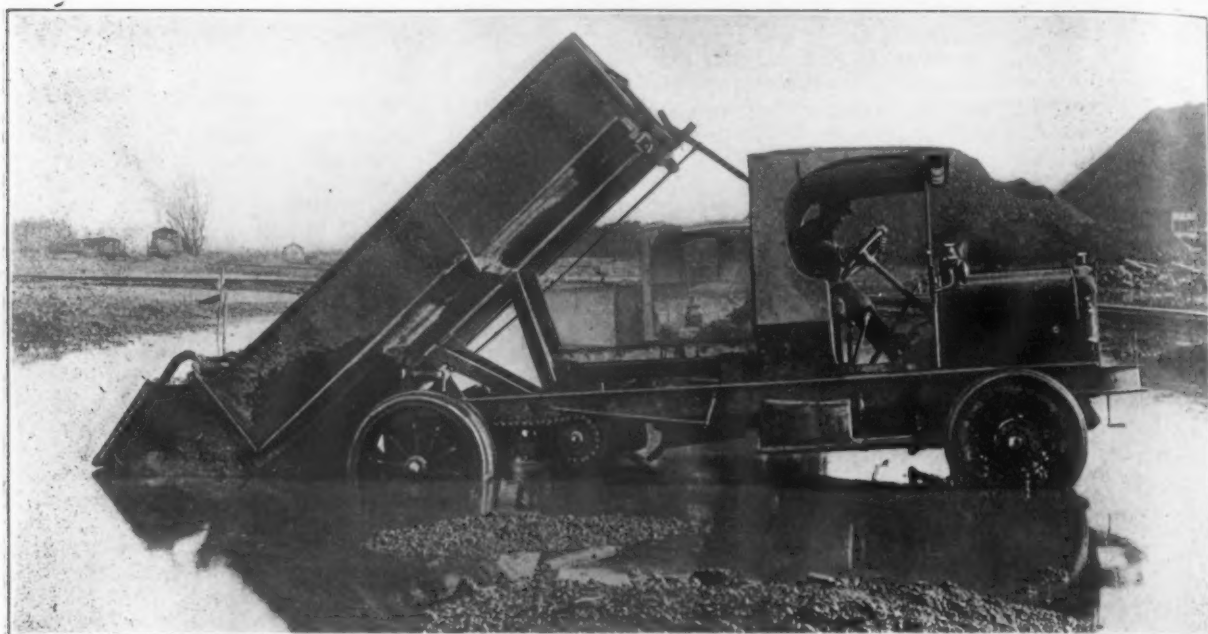
In conclusion, the author wishes to point out and emphasize the fact that isolated impact tests used alone are misleading, but that by using them as a supplement to the data obtained by other methods of testing, they give us extremely useful and valuable information.

Heat Evolution in Recently Hardened Steel

Whether there is any spontaneous generation of heat in recently hardened steel was discussed by C. F. Brush and Sir Robert Hadfield in the presentation of the results of some experiments before the Royal Society (British) recently. Carbon steel, nickel-chromium steel specially susceptible to hardening, and other steels were quenched from hardening temperatures, and when cold placed in Dewar vacuum vessels so arranged as to have equal insulating efficiency. These vessels were placed in an airtight cylinder of thin copper embedded in granulated coke placed in another box surrounded by an air space and a further box. When the temperatures of the steels were carefully recorded it was found that there was an evolution of heat in minute but appreciable quantity.

While this phenomenon may not have any bearing on hardening results in industrial practice, it throws light upon the serious stresses and strained condition in the material produced in large masses of steel during hardening operations.

The New York office of Luria Brothers & Co., Reading, Pa., dealers in iron and steel, was removed on April 1 from 50 Church Street to room 1182 Woolworth Building, 233 Broadway.



STEEL WORKS EXCAVATION

Motor Trucks Used at Maryland Plant of Bethlehem Steel Company

Disposing of the material excavated for the new blowing engine house at the Sparrows Point plant of the Bethlehem Steel Company developed an interesting problem in haulage. This building will contain eight gas engines and the blowing apparatus required for the four blast furnaces which it is proposed to construct. The excavated material is to be used in filling low and submerged areas in the vicinity of the plant and at first small dump cars running over industrial railway tracks were employed. As it became necessary to tear up and relay the track every time a new spot was to be filled in, the cost of this work was high.

With a view to reducing this expenditure as much as possible, a fleet of five 5-ton White power dumping trucks and three steam shovels were secured and set at work. The nature of the ground over which the trucks operated is clearly brought out in the accompanying illustrations. The site of the blowing engine house was covered with from 12 to 15 in. of soft black mud, and portable motor-driven suction pumps had to be employed to dispose of the water which oozed up through the ground. In spite of this fact, it is stated that the trucks were able to move their loads faster than was possible with the dump cars, while in addition they were able to deliver material at 15 or 20 different places without waiting for the tracks to be moved. For a portion of the time the trucks operated in water up to the hubs as shown. It is stated that the cost of doing this work with motor trucks and steam shovels was about half of that for disposing of the spoil by the dump car method.



The Site of the New Blowing Engine House Was Located in Wet Ground, Necessitating the Use of a Small Portable Motor-Driven Pump to Prevent Interference with the Work of Excavation

Profit Sharing Will Not Satisfy Labor

The late Frederick W. Taylor, founder of scientific management, was one of those who had made a study of the subject of profit sharing and his conclusion was that as at present practised it could never be successful in preventing labor troubles. Some of his ideas are embodied in a hitherto unpublished letter which appeared in a late *Bulletin* of the Taylor Society. The letter in part is as follows:

No form of co-operation has yet been devised in which each individual is allowed free scope for his personal ambition. The second and almost equally strong reason for failure lies in the remoteness of the reward. Capital is not, on the average, generally speaking, receiving at the present time more than its fair share of the joint return given to capital and labor. One of the greatest misfortunes under which laboring people are now suffering is that they are not correctly informed on this very subject.

In the June (1912) *Atlantic Monthly*, Charles Norman Fay gives some apparently reliable statistics, which show that if the entire reward which now goes to capital were divided among all the working people of the country, the average head of the family could receive an addition of only 60 cents a day to his wages. That means that if the entire reward now received by capital were divided equally among all the people in the United States, each individual would receive only 13 cents a day. He further says:

Increased Productivity Necessary

The only true hope for an increase in prosperity to the working people lies in an increase in the productivity of every working man throughout the country. Whether this increase comes through greater personal efficiency, through a better order of co-operation, through the introduction of labor saving machinery, or from whatever source, it is to the increase of productivity of the whole mass of our people that the working people must look for an increase in their prosperity. This I conceive to be at the root of the whole labor problem.

If profit sharing would result in so stimulating the workmen who come under it that each one would very materially increase his daily output, say double his productivity, then I should look to profit sharing as the cure for the present troubles. My judgment and observation and study of men lead me to the conclusion, however, that profit sharing, while it would induce workmen to become slightly more productive, would not have the effect of greatly increasing the average output of the individual. This has been the history of practically all profit sharing institutions up to date.

The human animal is so constituted that he looks upon his own immediate individual welfare and happiness and ease and comfort as of vastly more importance than the welfare of his fellow beings. The only way to get a large output from the individual is to let him have, in plain sight and in the immediate future, a personal reward to him which shall be proportional in a way to the exertions and endeavor which he puts forth. The average workman cannot look forward for more than three weeks to a month for a reward. His reward must come to him at shorter intervals even than this, if he is to be stimulated to greater endeavor. As the character of the individual becomes less formed and weaker, this period must be made shorter and shorter.

One more thought in this matter. An important fact to bear in mind is that more than nineteen-twentieths of all the wealth produced in the world is consumed by the poor people, and not by what are called rich people. Any increase, therefore, in productivity of the individual simply increases the wealth of the world to that extent, and nineteen-twentieths of this increase goes straight to the poor people.

The Evinrude Motor Company, Milwaukee, has received official notice that the Spanish Government has adopted the Evinrude detachable rowboat motor as standard for diversified uses in its navy. At present 25 governments are using the Milwaukee product as standard equipment.

Colorado Fuel Pension Plan

The Colorado Fuel & Iron Company has established a pension system called the "Service Retirement Plan." All employees and officials, except the president, who have given their entire time to the service of the company, including its subsidiaries, are eligible for service retirement payment. Men who have reached the age of 65 years (women, 55 years) and who have been 20 years or longer in the service will be retired automatically except in individual cases where the board decides to set a later date. The Board will consider an application for retirement from any man who has reached the age of 60, or a woman of 50, and who has been 30 years or longer in the service. An employee 15 years or longer in the service who by physical examination is shown to be permanently incapacitated for any service may be granted a special allowance.

The monthly payment for regular allowances will be 30 per cent of the average pay per month of service over the 10 years immediately preceding retirement; but no regular allowance will be less than \$20 per month. For instance, a retired employee whose pay for the 10 years preceding his retirement has averaged \$80 per month will receive \$24 per month. The amount and duration of each special allowance will be determined by the Board. Credit is given for all the time employees have actually been on the pay roll, even though the service has not been continuous.

Payment will end with the death of an employee unless the board decides to continue it to widows and orphans for a limited period. As these allowances are purely voluntary they will not be liable, before payment, to claims of creditors or to any attachment, or execution for debts of the beneficiary. No assignment of amount authorized will be permitted and the plan is subject to annulment by the board.

Museum of Safety Medals Awarded

The trustees of the American Museum of Safety have awarded to the Julius King Optical Company, New York City, the Louis Livingston Seaman medal for the year 1916. This medal is awarded "for progress and achievement in the promotion of hygiene and the mitigation of occupational disease," and thus recognizes the company's production of "a scientifically correct color scheme for lenses in goggles worn by workmen exposed to intense glare of metallurgical reactions, arc welding, etc." The jury of award also recognized the excellence of the babbitting mask, helmets, chip-pers' goggles, and various other devices produced by the company for the mitigation of occupational hazards. Other awards were as follows: The Travelers Insurance Company medal to the Commonwealth Steel Company, St. Louis, for its safety system, sanitary equipment, and fellowship work; the *Scientific American* medal to the Pullman Company, for a device to prevent telescoping of cars in train wrecks; and the Anthony N. Brady medal to the Connecticut Company, New Haven, for health and life protection on its electric railroad. The actual awards will be made at a dinner, which will be held probably in April in New York City.

Over 200 geared steam turbines for ship propulsion are said to be under contract or construction at the present time in this country. The De Laval Steam Turbine Company, Trenton, N. J., is credited with having over 150,000 hp. of these units in course of construction at its shops. The turbines take steam at a pressure of from 180 to 265 lb. and exhaust into a high vacuum of 28 in. They give 9 to 14 hp. per cu. ft. of space occupied for units ranging from 1500 to 2500 hp.

The *Calumet Record*, South Chicago, Ill., edited for 20 years by Major Henry W. Lee, has enlarged its industrial news department to include the entire Calumet region in both Illinois and Indiana. It publishes a table of over 300 industrial plants located in the territory mentioned, giving in many instances the number of employees, capital invested, area of plant and date established.

Alloys of the Non-Ferrous Metals*

Development in Their Scientific Study—Manganese and Aluminum Bronze—Co-operation Between the Metallurgist and the Engineer

—BY W. M. CORSE AND G. F. COMSTOCK—

ALLOYS have been known for hundreds of years but their scientific study has been undertaken only in the past 25 years. This period has been marked by several distinct phases of development:

The advent of the chemist and metallographist into the trade.

The exchange of information through trade journals and scientific societies. The oldest trade journal was started in 1902 and the two scientific societies, the American Institute of Metals and the Institute of Metals of Great Britain were founded in 1907 and 1909 respectively.

The application of knowledge gained to engineering problems and shop methods both from a manufacturing and consuming viewpoint.

These three phases enabled information pertaining to the industry to be widely disseminated, and the exchange of knowledge has led to many permanent advances and made possible many developments; for instance, aluminum is now a commercial article; magnesium, tungsten, titanium and vanadium are well known and have important uses. The methods employed

scope. The record of temperature gives the melting point, freezing point and critical temperatures of the alloy; the microscope shows its structures, and these two determinations taken in conjunction reveal very valuable data.

Copper, tin, lead, zinc, aluminum and antimony are the most useful of the non-ferrous group. The metals alone have many uses, but the field is widened when metallic alloys are produced. Copper and tin with copper above 80 per cent form the true bronzes. Other metals added confer special properties but the dominating feature of the alloy is the copper-tin base. Lead, for example, is added to aid in machining and zinc to promote soundness. Copper and zinc with copper above 56 per cent form the true brasses. These also are modified by the addition of a third or fourth metal such as tin or lead, but still possess the properties of the basic copper-zinc combination in the particular proportion specified.

For some reason the term bronze is also applied to other combinations than copper-tin alloys; for example,

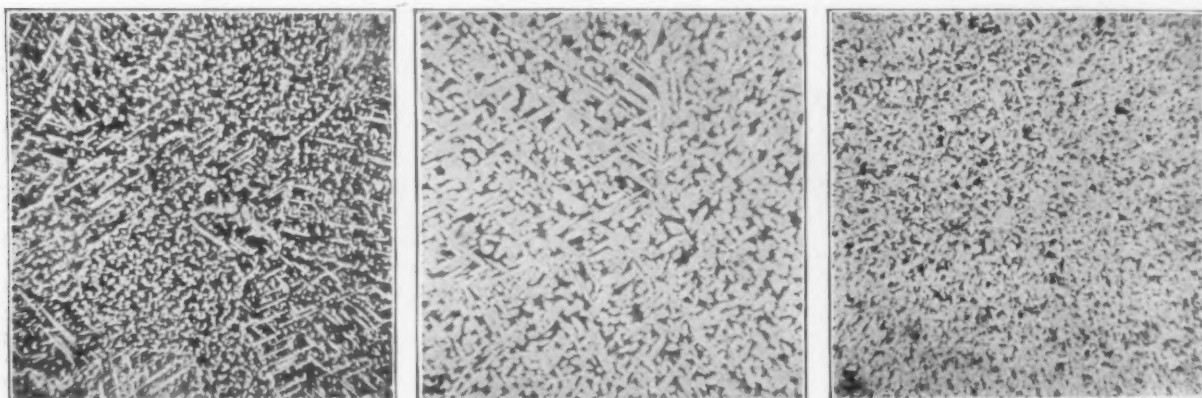


Fig. 1 Shows the Structure of a Rather Coarse-Grained and Soft Manganese Bronze, Magnified 20 Diameters. Fig. 2 is the typical structure of 10 per cent aluminum bronze, magnified 20 diameters. Fig. 3 represents the typical structure of an alloy of copper with 10 per cent aluminum and 4 per cent iron. The magnification is 20 diameters

in studying alloys have been conveniently classified by Roberts-Austen and Stansfield under

The chemical grouping of the metals in a solid alloy;
The separation of the constituents during solidification.

The first of these includes the methods of investigating their specific gravity, electrical resistance, diffusion, electrolytic conduction, thermoelectric power, heat of combination, electromotive force of solution, also the isolation of constituents by chemical methods, and microscopic examination.

The second group deals with those methods involving a study of the separation of the constituents of an alloy on solidification, and includes measurement of fall of temperature during solidification by means of a pyrometer, mechanical separation of the constituents of an alloy by heating to definite temperatures and draining off or pressing out the liquid portion, and investigation of the changes in the magnetic character of certain alloys during heating and cooling.

The methods thus outlined have given valuable results, but according to Gulliver the most fruitful results have been obtained by considering alloys as solutions of metals in each other and studying them by means of the thermometer or pyrometer and the micro-

manganese bronze. This is a copper-zinc alloy approximately 60 per cent copper and 40 per cent zinc, to which a hardener, consisting principally of iron, is added. Aluminum bronze is another example; it is an alloy approximating 90 to 95 per cent copper and 5 to 10 per cent aluminum.

Tempered Copper of the Ancients

One of the questions frequently asked in engineering circles is how the ancients tempered copper. Various attempts have been made to claim the discovery of this lost art but without much success. The facts are that the tempered copper of the ancients was an alloy and not a pure metal. The chemist has shown us that it contained iron and tin in sufficient quantities to harden the metal. The main difference between ancient and modern metallurgy lies in the purity of the metals produced. The ancients really made alloys instead of pure metals, and secured the corresponding properties of alloys while assuming that what they handled was pure metal. While this fact has been known for a long time, the slow dissemination of metallurgical information gives ample opportunity for the country drug store to produce several discoveries of this lost art annually.

While it is generally known that small amounts of certain elements such as carbon, phosphorus and sulphur exert a profound influence on the properties of

*Abstracted from a paper presented at a meeting of the Steel Treating Research Club of Detroit in that city, April 3. The authors are connected with the Titanium Alloy Mfg. Company, Niagara Falls, N. Y.

steel, it is not as generally known that small amounts of certain elements such as oxygen, sulphur, vanadium, titanium and phosphorous also exert profound influence on the properties of certain non-ferrous alloys.

The study of the metals in the bronze foundry is a larger proportion of the scientific work to be done than the same study in the iron or steel foundry. The iron foundry has but a few grades of metal to make, while the brass foundry or casting shop may have a hundred standard formulæ for alloys and several times as many for special cases. Each alloy requires the thought and attention of the man in charge. The importance of the study of metallic alloys will furnish sufficient work for years to come.

We should also like to mention the need of co-operation between the metallurgist and the engineer. Instances of lack of knowledge on alloys come up every day. For example, a large railroad recently specified an alloy of copper, 58 per cent; tin, 40 per cent; zinc, 2 per cent. We inquired the need for such an alloy and received the reply that the service of the part in question demanded a hard metal, and in an effort to find one a consulting engineer was asked to suggest a formula. The suggested alloy is certainly hard, but it is so brittle that if the casting were allowed to drop on the floor it would break into a hundred pieces. Twenty per cent tin in that alloy would have been about the limit.

Tests Bars and the Properties of the Casting

Another point to be emphasized is the difference which exists between results of test bars and the prop-

10 per cent aluminum bronze, cast in sand, and magnified and etched in the same way as the previous views of manganese bronze is shown by Fig. 2. This alloy is seen to be normally coarser grained than manganese bronze, and to have more of the light constituent, which is softer, and less of the dark constituent, which is harder. Consequently its yield point is lower than that of manganese bronze, but its ultimate strength and ductility are just as good, and in endurance or resistance to fatigue, and in bearing qualities, it is far superior. It also resists corrosion very well.

We have found that the addition of iron to aluminum bronze refines the grain very decidedly, and gives a higher yield point and slight improvements in other properties except the resistance to corrosion. Fig. 3 shows the typical structure of an alloy of copper with 10 per cent aluminum and 4 per cent iron, magnified and etched as in Fig. 2, the distinctive characteristics being the fine grain and absence of the long parallel needles always seen in ordinary aluminum-bronze castings.

Aluminum bronze shares with steel the property of hardening in quenching, with the formation of a peculiar martensitic structure, as shown here. The structure in Fig. 4 was produced by heating a small piece of 10 per cent aluminum bronze to 900 deg. cent. and quenching it rapidly from this temperature in cold water. This is magnified 200 diameters. Such metal as this is strong, often taking over 100,000 lb. per sq. in. to break it, but has no ductility. It has a hardness of about 200 Brinell. As in the case of steel, a double heat-treatment consisting of quenching followed by tem-

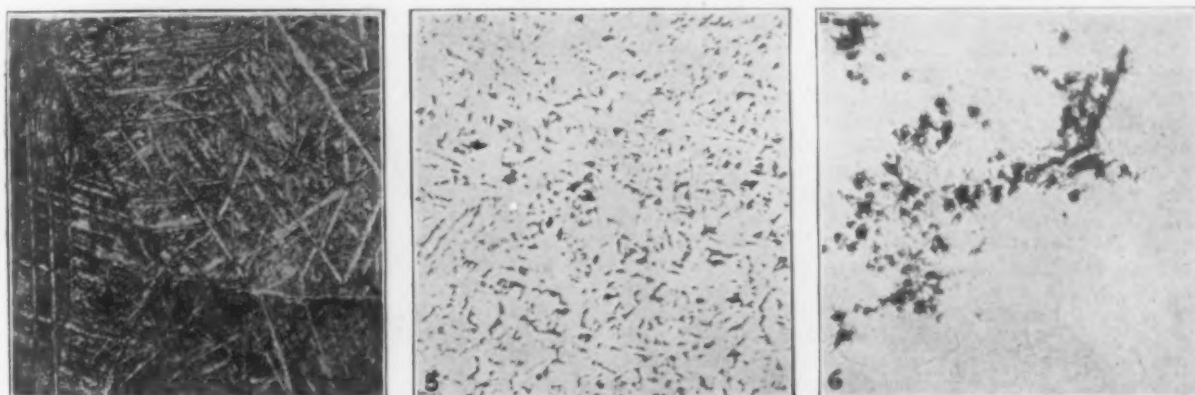


Fig. 4 is the Structure of 10 Per Cent Aluminum Bronze Heated to 900 Deg. C. and Quenched Rapidly in Cold Water. The magnification is 200 diameters. Fig. 5 shows the structure obtained by reheating a quenched 10 per cent aluminum bronze to a dull red heat and cooling slowly. It is magnified 200 diameters. Fig. 6 shows inclusions of aluminum in aluminum bronze, magnified 200 diameters and not etched

erties of the casting itself. Design, relation of thick and thin sections, and weight all have a very direct bearing on the result. Many engineers do not possess data on the relation between the strength of the test bar and the strength of the casting. Although the matter has been the subject of a few articles, it will bear repeating, as many misunderstandings arise through a lack of knowledge of this relation. We know there is a wide discrepancy between the two, but do not have sufficient information as yet to warrant the formulation of a rule. The fact is mentioned so that engineers will recognize that the condition exists, and be willing to co-operate in getting more data on the subject.

Manganese and Aluminum Bronze

Fig. 1 shows the structure of a rather coarse-grained and soft manganese bronze, magnified 20 diameters. The metal when just solid in cooling from the liquid state consisted entirely of the dark constituent; on further cooling the bright needles separated out along the cleavage planes of the original crystals. The different original crystals may thus be distinguished, not only by the color assumed in etching, but also by the directions of the bright needles in them. Another non-ferrous alloy which has strength and ductility comparable with manganese bronze and steel is aluminum bronze, a name applied to alloys of copper with up to 10 or 12 per cent aluminum. The structure of a typical

pering gives superior qualities. Fig. 5 shows a structure obtained by reheating a quenched 10 per cent aluminum bronze to a dull red heat and cooling slowly. The structure is shown magnified 200 diameters and is much finer than is ever obtained in an untreated casting. This metal has a high yield point and a high ultimate strength, with over 10 per cent elongation and very great resistance to fatigue. The casting of aluminum bronze is especially difficult because of the easy formation of oxide of aluminum in the metal and the great difficulty of removing it afterward. Fig. 6 shows some inclusions of aluminum in aluminum bronze, magnified 200 diameters and not etched. It takes special care and the use of special fluxes to prevent the occurrence of such inclusions in all alloys containing notable quantities of aluminum.

(The original paper contained 24 photomicrographs of various non-ferrous alloys.)

The De Laval Steam Turbine Company, Trenton, N. J., has issued a pamphlet giving a thermodynamic analysis of the duty test of its steam-turbine-driven centrifugal pump installed at the low level pumping station at Montreal. When this test was made the duty shown was more than that previously recorded for a pump of this type, 168,300,000 ft. lb. per 1000 lb. of steam. The basis of the figures was criticized at the time the results were published and the pamphlet is the answer.

Inventions the Life of Technical Business

Research and Experimental Laboratory
Important Factor in Modern Successes—
Foresight and Innovation, Not Patents, Win

IN an address delivered before the Technical Publicity Association, New York, March 8, 1917, George H. Gibson, consulting engineer, New York City, spoke on the commercial development of technical businesses. "The days have about gone by," Mr. Gibson observed, "when one good idea would keep a family in business for several generations. Every manufacturer, particularly a manufacturer of engineering appliances and products, must maintain a constant output of improvements and new developments in order to protect his investment in plant, organization, and good will. As has justly been said, the invention of a new machine or process by someone else may be as disastrous as a fire, and far more likely to occur." Mr. Gibson spoke, in part, as follows:

Few Businesses Founded on Patents Alone

Many people have the idea that the invention is the important thing. Very few engineering businesses, however, are founded altogether on exclusive and basic patents. They are based rather on a combination of scientific knowledge and business sagacity, with the help of such protection, monopoly or trading advantage as can be obtained from the detail patents which it may be possible to secure as the development of the art unfolds itself. A man may have the germ of a good idea for a successful business, but still nothing that can be protected by a patent, even though patentable improvements will doubtless be discovered upon developing the idea. Nevertheless, the essential factor is the broad judgment or foresight which leads him to take up certain matters at a particular juncture, and not the specific mechanical contrivances by which he may carry out his ideas. In such cases, the best protection to the idea is advertising, by means of which he can promptly get the full benefit of the potential demand for his product before competitors have had time to imitate and develop. Once he has his organization and business well under way, competition will be at a disadvantage.

For businesses up to a certain size, there is nothing that will beat one-man efficiency. The man who can see a need or an opportunity for a need and act accordingly is fit to be the head of a business, if he is also an administrator. However, the organization of modern industrial enterprises branches out into a great multiplicity of specialized details and we cannot always get in one man all those qualities of genius that are necessary in the inventor, in the captain of industry and in the promotion expert. We, therefore, have performing these functions a number of men who may be described as follows:

General Strategist to Foresee Trend

First, there is the general strategist, who may have the title of president, general manager, chief engineer, and not infrequently sales manager, since the study of how to sell a product as already built leads almost invariably to the discovery of improvements whereby it can more easily be sold in larger volume and at a greater profit. It is his disposition and function never to be satisfied with things as they are. He is continually studying the trend of engineering, scientific and business developments, with a view to visualizing their probable future course. His policy is to build a monopoly of information and brains and then to serve the public with little or no competition by having the best solution for each new problem as it arises.

A good example of the necessity of appreciating research on the part of the directors of industrial enterprises is supplied by the editor of *London Engineering*, who relates that the firm of Simpson, Maule & Nicholson, in their day leading manufacturing chemists in England, became millionaires largely through the fact

that Nicholson was a very able chemist. When he retired, the firm ceased to develop. His successors employed several very able chemists, but these had no control over the business policy and the end was disaster. At one time their leading chemist was the late Professor Meldola. When he invented his blue, however, the firm refused to take it up, and he accordingly published an account of his discovery, with the result that it founded the fortune of a leading German firm. The successor of Meldola was Professor Green, who invented primulin, a dye of an entirely new type. This the firm refused to patent, and within a few weeks it was in consequence made in Germany, the whole advantage being lost to England.

The steam-turbine-driven centrifugal pump requires precise, scientific design, and accurate manufacturing methods, in order to secure both efficiency and reliability, but if some one of the original pump builders had devoted a modest fraction of the time and money spent in copying other reciprocating pump builders to intelligently directed research and commercial development work, he might, while continuing to supply the demand for reciprocating pumps then existing, have created a new and exclusive market for himself. It remained for entire outsiders, steam turbine builders, to perfect and introduce the steam-turbine-driven centrifugal pump.

Unhindered Scientific Intelligence Department Necessary

Second, we have the inventor or research man. His endeavor specifically is to put the existing business out of business by bringing out something better. He must be an independent thinker, and his department is primarily a thinking and scientific intelligence department, largely free from dictation and direction by minds engaged in the routine of the business. The business man is generally about as good an inventor or research man as the inventor is a business man.

I have separated the research man from the designer, as it is not so necessary that the researcher-inventor should design as that he should be able to see things from both the maker's and the user's points of view, have a wide play of fancy and the power to correlate facts. He reads everything. He may even at times take delight in considering the improbable or the unlikely from a spirit of mere novelty and adventure. The man who makes radical inventions is a man of vision, and perhaps of visions; he must penetrate the curtain of convention and habit. One thing is sure, he must not be overburdened with routine, must not travel in a rut, and must never entertain the idea that anything has reached finality, or that he has done his utmost. He can quite properly be stimulated to venture freely in the quest for good ideas by some kind of contingent reward, something that will make the work interesting. He should not be discouraged by indefinite, intangible promises or by the offer of a mere fixed salary that may stop at any time.

A few concerns have grasped the value of always pushing forward; it is said, for example, that one automobile builder spends \$500,000 per year in research and development. A great number, however, hardly do more than trust for their progress to the inconstant and flickering light of chance ideas.

Designer Must Act as Check

The third member of our ideal technical business organization is the designer, the man who works ideas into shape for the shop and the user. While upon his sagacity and skill depend tremendous economies in manufacture, as well as satisfactory performance of the finished article, he is essentially conservative, a stand-patter, having a keen realization of the fact that

every scratch of a draftsman's pencil costs money in the pattern shop, foundry and machine shop. The attempt to conduct research in the production department usually demoralizes the latter, while rendering the research impotent.

Drilling Machine Feeds and Speeds

In a paper presented before the American Society of Mechanical Engineers in December, 1916, Carl G. Barth* advocated the adoption of a speed and feed series for machine tools that would be in a geometric progression, the ratio of which would be $\sqrt[3]{2}$. H. M. Norris, Cincinnati-Bickford Tool Company, criticises Mr. Barth's suggestion so far as it applies to drilling machines. His discussion of the paper, in part, is as follows:

The ratio of progression most favored by Mr. Barth appears in the first column of Table 1. The second column gives the corresponding number of revolutions per minute, and the third the diameters of drills which this series would drive at a cutting speed of 80 ft. per min. To my mind this is not as efficacious a series as that obtained from a ratio giving both desired extremes, columns 4, 5 and 6. Here we have fifteen speeds for drills from $\frac{5}{16}$ to $\frac{1}{2}$ in. in diameter, while under the former gradation there are but twelve.

But why use either? Instead of deciding upon a series and then seeing what drills it will drive at a certain cutting speed, is it not better to decide first upon the drill diameters and then try to obtain the exact speed for each, regardless of the ratio of advance? Suppose, for example, we set down, as in column 7, the diameters of drills we would like a machine to drive at a cutting speed of 80 ft. per min. It is an easy matter to ascertain at what number of revolutions per minute each should run, column 8. Here each harmonic group of speeds may be obtained from a five-change speed box or a 2-to-1 motor, while back gears made in the ratio of 1 to 1, 1 to 2, 1 to 4, 1 to 8, etc., will give as many successive geometric groups as desired.



F. W. SINRAM

Gear Manufacturers Organize

An organization of gear manufacturers, formed at a meeting held at Lakewood, N. J., March 26 and 27, will be known as the American Gear Manufacturers' Association. It is expected that practically all the leading gear manufacturers of the country will become members. About 15 of these were represented at the meeting, but a number of others have signified their intention of becoming identified with the organization.

The gear-making industry is divided into three general classifications—industrial mill or job gears, automobile gears, and gears and pinions for electric and mine motors. The objects of the new association include the discussion of subjects of interest to gear manufacturers, the advance and improvement of the industry, the collection and dissemination of statistics and other information of value to the trade, the standardization of gear design, manufacture and application, the promotion of a spirit of co-operation among the members, improved production and increased application of gears. The organization was perfected by the election of the following officers:

President, F. W. Sinram, Van Dorn & Dutton Company, Cleveland; vice-president, H. E. Eberhardt, Newark Gear Cutting Machine Company, Newark, N. J.; secretary, F. D. Hamlin, Earle Gear & Machine Company, Philadelphia; treasurer, Frank Horsburgh, Horsburgh & Scott, Cleveland. Executive Committee: Messrs. Sinram, Eberhardt, Hamlin and Horsburgh, with Biddle Arthur, Smonds Mfg. Company, Pittsburgh, George L. Markland, Philadelphia Gear Works, Philadelphia, and Milton Rupert, R. D. Nuttall Company, Pittsburgh.

The next meeting of the association will be held at Pittsburgh May 14 and 15.

California Magnesite

A native magnesite, which is claimed to compare most favorably with the famous Austrian magnesite, is being mined in California by R. D. Adams, at a point near Rutherford, Cal. The burnt mineral, as it leaves the shipping point, is low in lime, not over 3 per cent, and contains an amount of iron and alumina, 4 to 7 per cent, which is said to closely resemble the Austrian. The magnesia content is over 86 per cent. Three steel companies on the Pacific coast are using it successfully, it is reported; they are the Llewellyn Iron Works, Los Angeles; Pacific Coast Steel Company, San Francisco, and Southern California Iron & Steel Company, Los Angeles. Mr. Adams is also shipping 10,000 tons per month to Eastern markets and the American Refractories Company, Chicago, is stated to be using it. Before the war the calcined Austrian variety sold at \$16.50 per ton seaboard, but at present the price of the best quality of dead-burnt magnesite is \$100 to \$110 per ton. After the war Mr. Adams hopes to be able to furnish his brands at the normal market prices in Eastern territory.

Steps toward organized work in the promotion of the welfare of employees in Canton, Ohio, factories have been taken by some of the manufacturing and other interests of that city, who have formed the Canton Industrial Company, with a capital stock of \$50,000. The object of the company is to promote industrial training and development, to build homes, to assist in the betterment of working conditions, to promote goodwill between employers and employees, to correct transportation abuses, and to collect and circulate information relating to the manufacturing and other interests.

Creditors of the bankrupt Dayton Coal & Iron Company, Dayton, Tenn., have approved the offer of Francis C. Cary, Minneapolis, Minn., to purchase the property.

Table 1—Comparison of Barth, Norris and Usual Methods of Calculating Drill Ratios

Barth			Usual Method			Norris		
Ratio	R.P.M.	In.	Ratio	R.P.M.	In.	In.	R.P.M.	Ratio
1.000	43.3	7.09	1.000	67.9	4.50	4 1/2	67.9	1.000
1.189	51.5	5.93	1.152	78.2	3.91	4	76.4	1.125
1.414	61.2	4.99	1.326	90.1	3.39	3 1/2	87.4	1.285
1.682	72.8	4.20	1.527	103.7	2.94	3	101.9	1.500
2.000	86.6	3.53	1.759	119.4	2.56	2 1/2	122.2	1.800
2.378	102.8	2.97	2.025	137.5	2.22	2 1/4	135.8	2.000
2.828	122.3	2.49	2.332	158.3	1.93	2	152.8	2.250
3.364	145.6	2.10	2.686	182.2	1.68	1 3/4	174.5	2.570
4.000	173.2	1.77	3.093	210.0	1.46	1 1/2	203.8	3.000
4.757	205.8	1.48	3.552	241.0	1.27	1 1/4	244.4	3.600
5.657	244.8	1.25	4.103	278.6	1.098	1 1/8	271.6	4.000
6.727	291.0	1.05	4.725	321.0	0.952	1	305.6	4.500
8.000	346.0	0.883	5.441	369.0	0.838	3/4	349.2	5.140
9.514	411.6	0.742	6.266	425.0	0.720	3/8	407.5	6.000
11.314	488.9	0.625	7.215	488.9	0.625	5/8	488.9	7.200

*See THE IRON AGE, Dec. 21, 1916, page 1394.

The Industrial Association of Cleveland, Ohio, at its annual meeting last week, elected new officers as follows: President, Charles Woodward, president Charles Woodward Company, efficiency engineer; vice-president, H. B. Bole, works manager Hydraulic Pressed Steel Company; treasurer, Melvin Patterson, assistant manager Brown Hoisting & Machinery Company; secretary and counsel, Edward Hobday. Executive Committee, the above-named officers and J. H. Foster, president Hydraulic Pressed Steel Company; C. E. Thompson, president Steel Products Company, and Willard Fuller, general superintendent Upson Nut Company.

ASKS AID OF NATIONAL BODIES

Third Conference of Committee on Engineering Co-operation Held at Chicago

The third conference of the Committee on Engineering Co-operation, which was held in the rooms of the Western Society of Engineers, Monadnock Building, Chicago, March 29 and 30, took definite steps toward formulating a statement of its aims and went on record as being desirous of having a plan of action formulated by the national engineering societies. That a plan so devised should be accepted, provided it does not contain objectionable features, was the consensus of opinion. After a debate which lasted over the better part of Friday afternoon, the conference adopted the following resolution:

Resolved, That this conference requests and urges the national engineering societies in designing the engineering council to give consideration to, and create as soon as proper deliberation may permit, the machinery necessary to provide for a general permanent body of representatives of the various national, State and local organizations of the country in the interest of the common welfare and advancement of the profession as a whole.

About 60 engineers, representing 40 societies, were present. At the morning and afternoon sessions of Thursday several addresses were made by men eminent in the engineering world. Prof. F. H. Newell, University of Illinois, chairman of the committee, presided at the sessions.

The most important matter before the conference was the report of the sub-committee on plan of the National Committee on Engineering Co-operation, the personnel of which was as follows: Hunter McDonald, Isham Randolph, F. H. Newell, M. L. Cooke and C. E. Drayer. The first conference was held at Buffalo, June 23 and 24, 1915, and the second at Chicago, April 13 and 14, 1916. It was at the latter meeting that the sub-committee was created, and instructed to devise a plan for forwarding co-operation among the engineering bodies.

Part of Sub-Committee Report Approved

At the session of Friday the report of the sub-committee was taken up section by section, with the result that the following 10 sections were adopted, a few amendments having been made:

1. National Societies.—As a preliminary to all efforts toward co-operation among existing engineering organizations there should be the expressed intent to assist in strengthening and unifying the work of the national engineering societies in the advancement of engineering knowledge and practice and the maintenance of high professional standards.

2. Local Organizations.—The invigorating of local societies is fundamental because of the fact that while the great national societies are important in setting standards and in considering broad problems, yet local affairs make up at least nine-tenths of the vital problems of the engineer's life. In each locality where there may be a dozen or more engineers so situated as to be able to meet occasionally, there should be formed, if not already existing, an engineering association embracing all professional engineers and others interested in engineering to discuss and act upon these vital problems.

3. Home Rule.—Each local engineering society should be autonomous or self-governed, wholly free in its activities from any dictation or control by other association or connections, fully adapted to local needs and conditions, and exemplifying in its activities the principle of complete home rule.

4. Welfare of Members.—Each such local or self-governing unit in its organizations and activities should give full recognition to the fact that the majority of the membership necessarily consists of men not yet enjoying complete or independent professional status, but who in large part have had a college or technical training, and who in time may become professional engineers in the full sense of the word. Because of this diverse character of members, the activities of the local society, while maintaining high professional standards, should be so planned as to meet the needs of the young men as well as the older and be directed toward the welfare of all classes of its members and through them of the public.

5. Ethics.—Each local engineering society should adopt and frequently make application of a code of ethics prepared in

accord with the standards established by the national organizations or approved by other professional bodies. It is recognized that while it is impossible to prevent all violation of such a code, yet eternal vigilance is the price of maintenance of high standards. The enforcement of such a code is essential to the well being of the community at large as well as for the protection of professional men from the improper competition of unskilled or unscrupulous men tending to reduce the opportunity for effective service to individuals and to the public.

6. Civic Affairs.—Each engineering society should devote time and thought to local civic, State and national affairs which influence engineering progress.

7. The Public Engineer.—Each local society should give especial attention to the needs of those members who are in public employment, and should recognize the high ideals and performance of the public engineer, seeing to it that he is furnished sympathetic support in his efforts in the public service.

8. Publicity.—Each independent association should maintain a local system of diffusing information on engineering subjects such as may be embraced in the term publicity or of proper advertising of the profession as a whole.

9. Employment.—For the benefit of the great body of engineers there is needed the development of a scientifically planned and well conducted system of employment to be operated in co-operation by all engineering associations.

10. Conferences.—A conference of representatives from each engineering organization should be held at least annually, at which all matters such as those above noted and others of general interest should be discussed.

Debate Over Reported Resolutions

The remainder of the report of the sub-committee dealt with the questions of a field secretary, local representatives, printed matter and finances, and over these a wide divergence of opinion developed, and the sections covering them were not approved. Action on those which came after No. 10 was postponed until the report of the Resolutions Committee had been received. The report, in the form of a resolution, suggested that the report of the sub-committee be adopted as amended and that an Administrative Committee, with Mr. Newell as chairman and Mr. Drayer as secretary, be appointed, Mr. Newell to select three others. Prof. G. S. Williams of the Detroit Engineering Society, one of the several who participated in the debate, did not oppose the creation of the Administrative Committee suggested, nor was he against a provision that the committee should call meetings at such times and places as were found advisable, but he expressed himself strongly against the conference attempting to specifically outline the machinery by which the desired co-operation would be achieved, and it was he who fathered the resolution asking the national societies to consider and create the "machinery."

The delegates quickly followed each other in taking the floor. Some expressed doubt as to the extent to which the national societies would co-operate; others said they had been waiting for years for the larger organizations to do something; it was declared that the movement needed the strength of the national societies behind it; that it must not be overlooked that co-operation was the object sought, and the danger of having two co-operative movements was pointed out. One member made the point that confidence goes with co-operation. It was stated that the four great engineering societies have a committee at work on the co-operative idea, and a letter written by Charles F. Rand, and having to do with a similar movement instituted in New York, was read. Chairman Newell admitted that he had not known of the existence of the letter, nor that such progress had been made along the desired lines. A proposal that the word "create" in the resolution be changed to "suggest" did not win the approval of Professor Williams, and his amendment, with some minor revision, was finally accepted and the amended report then adopted.

Universal Military Training

Prior to the passage of several resolutions of thanks and appreciation, the following was unanimously adopted by a rising vote:

Whereas, There is now before the people of the United States the consideration of national protection and provision for military training of the citizens of our country, and

Whereas, Delegates assembled in the Third Annual Conference on Engineering Co-operation, representing more than 50,000 members of the engineering profession in local, State and national societies, are unanimous in their approval of adequate preparedness for the defense of the United States, and hereby pledge their support to aid in insuring the national safety and our national honor; therefore, be it

Resolved, That we urge the prompt enactment of legislation providing for efficient universal compulsory military training.

At the Thursday morning session, addresses were made, among others, by B. F. Affleck, president of the Universal Portland Cement Company, W. L. Saunders, as representing the Engineering Civic Federation; John H. Peyton, Engineers' Association of Nashville, Tenn.; and F. G. Jonah, Engineers' Club of St. Louis.

On Thursday afternoon, addresses were heard from Dean A. A. Potter of Kansas, who told of the land-grant colleges and their co-operation efforts; John W. Alvord, New England Water Works Association; P. Junkersfeld, who told what the American Institute of Electrical Engineers is doing for its members; Prof. C. Francis Harding, Indiana Engineering Society; J. S. Dennis, president Canadian Society of Civil Engineers; and E. E. Olp. A paper on how Canadian engineers organize was read for Prof. C. H. McLeod of Montreal.

Thursday evening an informal dinner was held, at which Dr. Edwin H. Lewis, dean of Lewis Institute, was toastmaster.

A New Split-Hand Time-Study Watch

Mortimer J. Silberberg, 122 South Michigan Avenue, Chicago, has recently brought out a new watch for time-study work. As compared with the watch illustrated



The Gross Time Required for Any Operation Together with the Non-Productive Periods Can Be Secured at One Observation with This Decimal Split-Hand Motion-Study Watch. One Hand Being Controlled by the Crown and the Other by the Side Plug

in THE IRON AGE, Feb. 3, 1916, a decimal computed dial has been combined with a split-hand watch. This arrangement enables the watch to be used for determining the gross time of an operation, while the non-productive time or delays can be deducted, thus giving both the gross and net times of an operation to an observer at a single reading.

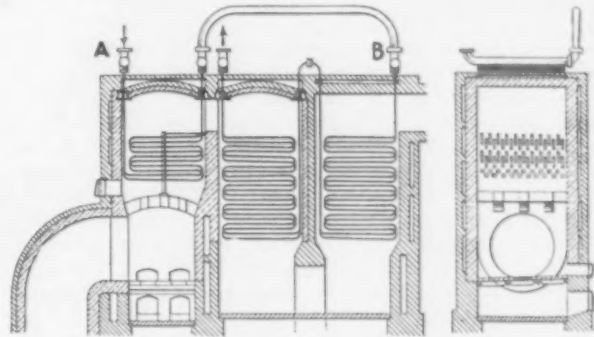
One of the two hands is controlled by the side plug and the other by the crown, or if it is desired to use both hands as a

unit the crown control can be employed to operate the pair. The dial is divided into graduations corresponding to 0.1 and 0.01 min., figures spaced 0.02 min. apart being provided which indicate what the corresponding hourly production would be at any point of the elapsed time. This feature was incorporated in the original instrument and has been retained in the same form ever since.

The Pittsburgh-Des Moines Steel Company, which operates steel fabricating plants for elevated tank and other plate work at Pittsburgh and Des Moines, Iowa, has opened an office at Chicago. This is in charge of Max Whitacre, formerly in the Des Moines office of the company, and is both an engineering and contracting office.

Waste Heat for Superheating

In a discussion of the paper "Utilization of Waste Heat for Steam Generating Purposes" presented by Arthur D. Pratt at the last annual meeting of the American Society of Mechanical Engineers, B. N. Broido, Perth Amboy, N. J., described a German waste



Superheater Utilizing Heat of Waste Gases

heat installation used for superheating steam. His contribution was in part as follows:

"In cases where for some reason superheaters cannot be installed in boilers, or in which circumstances require the superheater to be near the engine, independent superheaters are recommended. In such cases superheaters heated by waste gases are the ideal installation.

"The illustration shows such a superheater for 40,000 lb. of steam per hour, installed at the plant of the Coal Mining Company, Gesenkirchener Bergwerks Gesellschaft. The gases had an average temperature of about 1382 deg. Fahr.

"The moist steam enters the superheater at A in order to prevent rapid burning of the tubes at the point where the gases first come in contact with them. The steam flows through this portion of the superheater in the same direction as the gases, passes over to B and flows in the opposite direction, taking full advantage of counter-flow principle.

"With a velocity of the flue gases of about 900 ft. per min., and a velocity of steam inside of the pipes of about 5000 ft. per min., the average heat transfer was 4.3 B.t.u. per sq. ft. per deg. Fahr. temperature difference. The steam for this superheater was supplied by five waste-heat water-tube boilers, 300 hp. each, four of which were always in operation.

"On account of its smaller heating surface the cost of this independent superheater was considerably smaller than it would be with each boiler provided with its own superheater."

Will Test Metal Lath

The Publicity Bureau of the Associated Metal Lath Manufacturers has moved its offices from Chicago to Room 901, Swetland Building, Cleveland, and Zenas W. Carter, formerly of Boston, has been appointed commissioner, to supervise all its publicity, promotion and investigation. Mr. Carter has been manager for manufacturers' associations for the past 10 years. The association plans a co-operative national campaign of publicity which will be developed by the Council of Advertising Managers of the member companies, and will cover a series of tests of the fire-resistance properties of metal lath and its use in fire-retarding construction. The advertising managers who comprise the council are C. O. Powell, president Northwestern Expanded Metal Company; S. E. Fechheimer, Trussed Concrete Steel Company; R. M. Nicholson, Berger Mfg. Company; C. M. Stewart, Consolidated Expanded Metal Companies; L. E. Fisher, General Fireproofing Company; L. J. Rouleau, Penn Metal Company; F. E. Ericksen, Milwaukee Corrugating Company; William George Lane, secretary the Bostwick Steel Lath Company, and Zenas W. Carter, commissioner.

The Charde Lathe Company, Newcastle, Ind., has booked an order for 36 lathes to be shipped to Paris, France.

BETHLEHEM'S TIN-PLATE PLANT

Buildings and Equipment of Plant Now Being Built at Sparrows Point

The sheet and tin-plate plant now being built by the Bethlehem Steel Company, at Sparrows Point, Md., will comprise a colony of buildings, which like South Bethlehem structures of the company will be representative of the most modern type of permanent construction. They are of structural steel and brick throughout with fireproof roof and will constitute, it is emphasized, the only sheet and tin-plate plant in this country built entirely of brick. A building of this description is expected to provide cool working conditions in the summer and more comfort for the employees in the winter. The Aiken type of roof is used to secure also good light and ventilation. The doors are of the rolling type and the windows of heavy wire-ribbed glass.

There are four main buildings. The assorting room is 100 x 840 ft.; the tinhouse and tinhouse supply building is 66 x 840 ft.; the annealing, cold-rolling and pickling departments building is 115 x 756 ft., and the hot-mill building is 147 x 980 ft., with a bar shed 70 x 280 ft., which contains a 15-ton electric crane and adjoins the hot-mill building. In addition there is a large machine shop, blacksmith shop, carpenter shop and storehouse of the same character of construction as the main buildings. The office building is a standard Bethlehem Steel Company plan, built of structural steel and brick.

The mill building is constructed to accommodate 24 mills and accessories. The first unit of 12 mills is now being installed, but the plant has been completed as far as foundations, buildings and departments are concerned, to provide for the second 12-mill unit, which is to be installed in the near future. The hot mills are driven by two 1200-hp. motors, three mills on each side of each motor. This building contains two 25-ton electric cranes. Each mill is equipped with 3 furnaces, one pair furnace and two sheet furnaces, to permit an easier method for the men to handle the product.

The cut sheet bars are delivered at the rear of the furnaces by a 10-ton electric crane and charged into the pair furnace automatically by an electric charger. The crane will also be used for delivering coal to the hot-mill furnaces. The hot-mill standing is equipped with water-cooled floors. An air system has been introduced, the effort being to make the mill one of the coolest, if not the coolest, in the country.

The cold-rolling department consists of 12 stands of 24 x 36-in. cold rolls, driven in a tandem of three by a rope drive from 1200-hp. motor. The rope drive is being installed rather than a gear drive to get the most desirable surface condition on the sheets possible from a cold-rolling standpoint. There are five annealing furnaces. Three are for black annealing, situated in front of the cold rolls near the black pickling department. The two others are in close proximity to the white pickling department in the rear of the cold rolls. Every furnace throughout the plant is equipped with a stoker firing device. In the annealing and cold-rolling departments, there is a 25-ton electric crane.

There are 21 tinning stacks, provided for the first 12 mills. The tinning machines are all on one side of the tinhouse, adjoining the assorting room. The cleaning machine in connection with the tin pot is placed so that the finished tin plate will be delivered by conveyors directly into the assorting room, without the use of buggies or trucks. The tinhouse contains a 5-ton electric crane, for handling supplies and delivering sheets from the pickler to the tinning machines. In the tinhouse building, there are large capacity storerooms for tinhouse supplies, thus avoiding the necessity, as is usually the case, of carrying the necessary supplies for the tinhouse from remote buildings.

The assorting room has a wood block floor. The loading of the product for shipment will be done inside of room, which is also the warehouse.

The floor of the machine shop is the same kind of wood block floor as the assorting room. The mechanical

equipment throughout the entire plant will be electrically driven, which will make this plant, it is believed, the only tin-plate plant in the country driven entirely by motor power. Both surface and depressed standard gage tracks run into the buildings to load products and unload supplies. The plant is located on a point surrounded on three sides by the waters of Chesapeake Bay, and the location has been found most desirable for a mill of this character. Arrangements are being made for the transportation of the employees to and from their work.

The present output of this plant in tin plate will approximate 1,000,000 base boxes annually, but when the 24 mills go in operation, there will be an annual production of approximately 2,000,000 base boxes.

Cayuga Tool Steel Company, Ltd.

The Cayuga Tool Steel Company, Ltd., has been organized under the laws of New York, with works at Auburn, N. Y., to manufacture crucible tool and electric alloy steels. The equipment is to include three Rennerfelt electric furnaces, two of 3 tons' capacity and one of 1 ton, and besides the crucible furnaces, six hammers and three rolling mills. The plans comprehend an 85 x 360-ft. shop and rolling mill building and an 80 x 120-ft. melting and annealing building, and a boiler house, machine shop, shipping building and blacksmith and other shops. The site has a siding from the Lehigh Valley Railroad.

C. M. Hammond, for five years president of the Hammond Steel & Forging Company, Syracuse, N. Y., and formerly of the Sanderson Steel Company and the Halcomb Steel Company, is president. Thomas Towne, for 22 years connected with the Union Drawn Steel Company, Beaver Falls, Pa., and vice-president and general manager of the Swedish Iron & Steel Corporation, New York, is vice-president of the company and chairman of its board, and will be in charge of the commercial end of the business. The directors include A. E. Ballin, president and general manager McIntosh-Seymour Corporation, Auburn; Charles H. Burke, president Swedish Iron & Steel Corporation, and William J. Henry, president Henry & Allen, Inc., Auburn.

Springfield Industrial Exposition

Change in the date of the Industrial Exposition and Export Conference at Springfield, Mass., to June 23-30 has been made to meet the wishes of a number of manufacturers who required more time than the earlier date (May 26 to June 2) would permit them in which to make ready for such representation as they desire to have. A large general committee, representative of the wide variety of American business interests, is giving its services to the management in an advisory capacity, and is planning a series of small meetings in manufacturing centers to acquaint the trades generally with the opportunity to reach a great home market as well as to co-operate for a united front in the foreign field. F. H. Page, president National Equipment Company, has been made chairman of this general committee, to have charge of the exposition. John C. Simpson is the general manager.

Prof. R. H. Fernald has conducted twenty-six members of the senior mechanical engineering class of the University of Pennsylvania, Philadelphia, on an inspection trip in the past two weeks. Starting March 21, the party first visited the Pittsburgh district, then going in turn to Cleveland, St. Louis, Chicago and Detroit. Among the plants visited were those of the Westinghouse Electric & Mfg. Company and National Tube Company in the Pittsburgh district; the Peerless Motor Car Company, Cleveland; Pullman Company, Pullman, Ill.; Indiana Steel Company, Gary, Ind.; Western Electric Company, Hawthorne, Ill., and Ford Motor Car Company, Detroit. A number of important power plants, pumping stations, etc., were included in the various cities, as well as factories in lines apart from metal working.

Judicial Decisions

ABSTRACTED BY A. L. STREET

DEFICIENT CAPACITY OF MACHINERY SOLD.—Where machinery is sold under a contract reserving title in the seller until payment of the agreed purchase price, the buyer is not entitled to recover damages for failure of the machinery to be of the value it was represented to be, until he becomes the owner of it. But this does not mean that the purchaser under such a contract cannot recover damages for diminished value of the use of the machinery on account of the seller's failure to deliver a machine of the capacity contracted for, especially where the seller knew the purpose for which the property was intended. Under the express terms of the California statutes, one who manufactures an article under an order for a particular purpose warrants by the sale that it is reasonably fit for that purpose. These principles are applied in a suit brought to recover damages for claimed breach of a contract to install proper engine and pump to be used by the buyer for water supply and irrigation purposes. (California District Court of Appeal, Lichtenthaler vs. Samson Iron Works, 162 Pacific Reporter, 441.)

INJURY TO CRANE ENGINEER.—The Supreme Court of Alabama has affirmed judgment in favor of an employee for injuries sustained while driving a nut on a cross-head pin of a crane engine. Owing to a leaky valve the engine started as plaintiff was striking a chisel, causing him to miss the chisel with the hammer and resulting in dislocation and fracture of his wrist. It is held that his knowledge of the defective condition of the valve did not charge him with assumption of the risk that resulted in his injury. (United States Cast Iron Pipe & Foundry Company vs. Warner, 73 Southern Reporter, 936.)

INTERFERENCE WITH TRACKAGE RIGHTS.—In a suit brought by a railroad company to enjoin a city from enforcing an ordinance providing for depression of railroad tracks within the city limits, an owner of a factory having switching connections with such tracks is entitled to be heard in opposition to the ordinance. (United States District Court, District of Minnesota, Chicago, Milwaukee & St. Paul Railway Company vs. City of Minneapolis, Minneapolis Steel & Machinery Company intervening, 238 Federal Reporter, 384.)

BUYER'S WAIVER OF RIGHT TO RESCIND PURCHASE.—The fact that the purchaser of fixtures notified the seller that they were unsatisfactory and demanded that they be taken back is not available to entitle the buyer to rescind the contract when afterward sued for the purchase price, he having in the meantime continued to use the fixtures as his own. (St. Louis Court of Appeals, St. Louis Carbonating & Mfg. Company vs. Loevenhart, 190 Southwestern Reporter, 627.)

UNFAITHFUL DEALINGS OF EMPLOYEE.—Under the New York statute which makes it a misdemeanor to offer an employee a gift or gratuity to influence his action in relation to the employer's business, without the employer's knowledge, an employee is not entitled to recover agreed compensation from a third person for obtaining a contract from the employer. (New York Supreme Court, Appellate Term, Bolotin vs. Jefferson, 163 New York Supplement, 59.)

MISUSE OF INFORMATION ACQUIRED IN LITIGATION.—Where a manufacturing company obtained a decree adjudging infringement of a patent and an order requiring defendant to produce its books as a basis for accounting for profits derived through the infringement, defendant is entitled to an injunction against plaintiff's action in sending letters to defendant's customers, whose names were ascertained by an examination of defendant's books, misrepresenting the scope of the infringement decree and endeavoring to divert the business of such customers from defendant to plaintiff. (United States Circuit Court of Appeals, Third Circuit, Rollman Mfg. Company vs. Universal Hardware Works, 238 Federal Reporter, 568.)

RETAIL DEALER'S RIGHTS ON BREACH OF WARRANTY.—Where a manufacturer of articles in selling them to

a dealer warrants their efficiency, the right of the dealer to recover the excess of the value of the goods as represented above their actual value is not affected by the fact that the dealer has sold the goods without making a similar warranty to his customers. (Indiana Appellate Court, K-W Ignition Company vs. Greenville Metal Products Company, 114 Northeastern Reporter, 989.)

PHASES OF MACHINERY SALES.—In an action to recover the purchase price of a locomotive sold to a coal-mining company, it is held that a seller of machinery makes no implied warranty as to its suitability to the buyer's particular intended use when the seller is not informed thereof. And the making of specific warranties in selling machinery negatives the existence of any implied warranties. But if it was understood that plaintiff would furnish a locomotive suited to use in mining operations, and if this was not done the buyer may counterclaim for damages, including consequential loss of coal production. (Kentucky Court of Appeals, Glover Machine Works vs. Cooke-Jellico Coal Company, 191 Northwestern Reporter, 516.)

The Engineer in War Service

The Cleveland Engineering Society is planning to make a canvass of its membership to secure a census of the qualifications of its members for different kinds of service to the United States Government. Its plan includes the securing from each member on a specially prepared blank a record of his training and professional experience. Accompanying this he may file an application for examination for a commission in the officers' reserve corps, as provided by the National Defense Act of last June. The acceptance of a commission is optional, but the submission of the application at least acquaints the Government with the existence of the individual and of his professional qualifications and puts him in a position to be of service later should a call to duty subsequently be sent to him.

The movement makes it clear that an engineer in any locality may secure a letter of application from the engineer officer of the Corps of Engineers stationed in his section of the country. It would appear that in any instance the applicant may be appointed to the position he now holds, his commission being merely a means of establishing definite co-operation with the Government. A reserve corps has been established for ordinance officers charged primarily with the fabrication of weapons and munitions, and a reserve corps for engineers for the quartermaster department covering particularly the use of motor vehicles, as for transportation. The submission of the application, as stated, involves no obligation. In due time the applicant is designated for examination. On accepting a commission the candidate places himself under obligation to serve in a branch in which he has been commissioned for a period of five years. In peace times he needs only to attend a course of instruction in a training camp or in a Government arsenal or depot for a period not exceeding 15 days in a calendar year.

Business Magnanimity

A certain big corporation, says the *Wall Street Journal*, was fortunate some years ago in getting a contract for a long period of years for raw material from a smaller corporation. It came to pass that prices of labor advanced sharply, so that the corporation which sold its raw material to its big client was making little or no money on its contract. Then the big corporation said: "You are not making any money out of the goods you sell, whereas we are making more money than we have ever made on our finished products. We'll do the square thing and pay you more than you are legally entitled to." This is the understanding of Wall Street interests. The big corporation referred to in court actions as merciless and contemptible is the United States Steel Corporation. The little brother benefited in the Pittsburgh Coal Company. Such things do not happen every day.

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The Nation at War

The President, in a ringing message, full of lofty purpose and unequivocal in its appeal to the national spirit, has summoned Congress and the American people to the highest undertaking that has been put before them since the Civil War. This country has not wanted war with Germany. Its people for more than two years have suffered provocations which a hundred years ago, in days of comparative weakness, but yet days of undiluted Americanism, would have brought on war quickly. And now at last there is the reckoning with a long restrained wrath, of which an aggressor, whether nation or individual, needs always to beware.

Whatever may be said in detail of the direct or the devious train of events that has brought us into the war, all comes back to this: It is not possible for this nation to remain a spectator in a war that is to decide whether the American type of liberty is secure in the world. Before the Civil War, the greatest American saw that this nation could not endure half slave and half free. It is likewise evident now that the world cannot long go on part free and part in the hands of autocrats who lately last of all have tried to impose their will on this country.

That the United States is not prepared for war is well known. But now every resource will be drawn upon so that the scourge may not long rest upon the land. No man can say what loss and what suffering must be endured. The declaration by Congress finds the country able and willing to back the President with money without limit. Of metals there is no lack and will be none, but time alone can make ships and guns and munitions measure up to the need. In organization, in unification and in making fully effective every resource, the United States should be far quicker to take its lesson from Germany than were the Allies. Many of the best minds in American industry have been at the command of the Government for months. If their advice has been only partly acted on, because of divided counsels on the need of making ready, no more time should now be lost in turning their talents to account.

It will be a mistake if any in authority enter the war with the thought that the vast majority of the leaders in industry, especially in industry that deals directly with the implements of war, take any less patriotic attitude than the vast majority of citizens

in other walks of life. This is the American people's war. They have had all opportunity in these months to count its cost and all should be prepared to sacrifice. Burdens should be adjusted according to ability to carry them. Heavily increased taxation is to be expected, but it should go all along the line. The steel and metal-working industries may be depended on to respond to every call, as was promised two months ago when the severing of diplomatic relations with Germany showed war to be near. Government work will be crowded ahead everywhere; Government contracts will be executed at prices far below the current market.

The Government's hand will be laid upon manufacturing and commerce, upon fuel and food supply, upon all the nation's activities, in a way little dreamed of as the people have gone on in the even tenor of peace. The new adjustments will be many and far reaching, as has already been foreshadowed in the new war-time alignment of government and industry in Europe. Not only is the aloofness of the United States from Old World political problems at an end, but a new day has come in the commercial and all other relations of this country and the Entente Allies.

A Tin-Plate Price Named

Unusual interest attaches to the naming of a price on tin plate for deliveries during the second half of this year, on account of representations made to Washington recently by canning interests that an acute scarcity was promised, threatening the large pack of the canning crops that was being planned. The tin-plate manufacturers summoned to Washington to discuss matters assured the Government that this year's tin-plate production would probably be very nearly equal to the capacity, and that if so the tonnage would be extremely large, even surpassing that of last year, which was at least one-third larger than in any previous year.

Last Saturday the American Sheet & Tin Plate Company named its price for second half deliveries, at \$7.50 per base box, 100-lb., sheet bars being quotable on that date at \$70 and pig tin at 54.25 cents. Prices for the first half of this year were named early last October, the independents announcing a price of \$6.00, while a few days later the leading interest announced its price at \$5.75.

This was the first time that prices had been made, and contracts entered, for a half year only, the custom in the trade having been to book contracts for the full calendar year. For many years the price of tin plate had followed very closely the fluctuations in the steel and tin markets. The consumption of pig tin is, roughly speaking, about 2 lb. per box, while the yield of sheet bars is about 20 boxes per gross ton. If one deducted from the season price the cost of 2 lb. of pig tin and one-twentieth of a ton of sheet bars, at the ruling markets on the date of the price announcement, the remainder would be almost the same each year. For the five seasons preceding this year the remainder averaged \$1.53, the extreme divergence from this average being only 6 cents.

With war prices prevailing in all quarters, all items entering into the cost of making a box of tin plate have greatly increased, and wages are at a record high rate, so that on this account alone the usual relation between the cost of tin and steel and the selling price of tin plate does not obtain. In the majority of finished steel commodities the price is much higher in proportion to the market price of steel than is usually the case. The usual computation, deducting the price of 2 lb. of pig tin and one-twentieth the price of a ton of sheet bars from the price of tin plate at \$7.50 leaves \$2.91, or \$1.38 per box more than the five-year average, and yet, all things considered, a price of \$7.50 for tin plate is a very moderate one. If the independents had named the price it would undoubtedly have been higher. There is a question, of course, whether the tin-plate mills that buy their sheet bars will pay an average price of \$70 for their second half supplies. On the other hand, there is a question whether they will be able to obtain their pig tin at an average equal to the present spot market. They must take a chance on that. Meanwhile they are carrying large stocks, on which they have a profit at the present market.

It is interesting how often a reform seems difficult in the prospect and easy in the retrospect. For years consumers of tin plate claimed it was absolutely essential for them to purchase their supply for a full calendar year at a fixed price, otherwise the wheels of their business would refuse to turn. Finally came the year 1916, with the tin-plate mills loaded with contracts for the full year, more than a year, it turned out in most instances, and with costs rapidly advancing, probably resulting in heavy losses to some at least. The risk could not be assumed again, and beginning with the present year the mills sell for only six months at a time, simply because they decided they would have to do so.

Measures Demanding Attention

Congress, in addition to attending to important matters directly connected with war with Germany, will find numerous other problems more or less directly connected with our foreign affairs demanding prompt consideration. As was clearly pointed out by the resolutions adopted by the National Foreign Trade Council at the special meeting held in New York last week, the number of foreign vessels available for trade between the United States

and neutral markets is decreasing more rapidly than American tonnage is increasing, while it is very probable that the needs of the Government for merchant tonnage will show a decided increase. It is highly important, therefore, that not only Congress but all departments, boards and commissions that have any connection with such matters shall heartily co-operate with merchants engaged in foreign trade and shipping, so that impressments by the Government shall cause as little embarrassment as possible consistent with the national security. The spirit of co-operation displayed by the Foreign Trade Council is characteristic not only of that body but of business men everywhere.

The action of the council in urging Congress to enact the Webb bill so that American exporters may have a better opportunity to engage in competition for foreign business will meet the hearty approval of the country. In view of the support given this bill by the President, the Federal Trade Commission, manufacturers, exporters and many others, the failure of Congress to pass it at the last session was most unfortunate. Several Congressmen attempted to load the bill down with objectionable amendments and apparently its supporters were not sufficiently vigorous in urging its passage. There should be no doubt about the enactment of this measure at the present special session.

The Steel Corporation

The statistics of production by the United States Steel Corporation in 1916 give a fairly accurate measure of the corporation's capacity, seeing that operations were substantially at capacity throughout the year. It was the first calendar year since 1906 in which production at all steel mills was not restricted to an extent by the state of order books. The corporation's output, of steel products in the form in which sold, was 15,460,792 tons, or within 10,000 tons of what would be produced in 309 working days at 50,000 tons per day, so that 50,000 tons may be taken as the corporation's average capacity for the year. The quantity is to be increased largely as new construction work now in progress is completed.

The capacity might be taken at a slightly larger amount, for a normal distribution of orders in the different finished products, for the reason that the output of finished steel relative to ingot production was unusually low in 1916, presumably on account of the production of much steel requiring liberal cropping of the ingot or the billet. In 1913 finished product was 74.30 per cent of the ingot production; in 1914, 76.22 per cent; in 1915, 71.83 per cent, and in 1916, 73.96 per cent. The figures would suggest that the closely cropped steel reached its maximum in 1915 rather than in 1916.

The relation existing between production of pig iron and production of ingots does not suggest that there was an unusually large employment of scrap at the Steel Corporation's open-hearth furnaces, as a means of utilizing the crops mentioned. The proportion of pig iron to ingot production was: 1913, 84.3 per cent; 1914, 84.6 per cent; 1915, 83.3 per cent; 1916, 84.2 per cent.

The "earnings per ton" is an item that always interests Wall Street. In 1916 the shipments were

15,542,088 tons (81,296 tons in excess of the production, despite the transportation situation) and the earnings \$333,574,177 or \$21.46 per ton. As the earnings per ton were about twice as great toward the close of the year as in January the year's average is not particularly suggestive of any fixed rate. Barring accidents and backsets, the corporation's earning this year should be from one-third to one-half greater than the phenomenal earnings in 1916, while those earnings were so large that, after all charges and dividends were provided for, the amount carried to surplus, \$201,835,585, was one-fourth greater than the entire earnings in any previous year. It is somewhat noteworthy that the entire amount was carried to surplus, no appropriations being made for the improvement accounts, though money was liberally expended during the year. The expenditures were in large part taken care of by previous appropriations. There was \$64,680,648 of capital expenditures, of which \$5,116,665 was written off to depreciation and replacement funds, while various other adjustments were made.

It is evidently the purpose of the corporation management to have its surplus in the most mobile condition possible at the close of the war, the book surplus having been increased during the year from \$180,025,329 to \$381,360,913. The corporation started on April 1, 1901, with a book surplus of \$116,356,111, apart from the \$25,000,000 provided in the course of its organization, but this sum was written off, being deducted from the property account, on the balance sheet of Dec. 31, 1902, so that the present surplus, outside the \$25,000,000 has been accumulated during the corporation's tenure of the properties.

A Victory for Arbitration

An important victory for arbitration of labor disputes was won by employers in the building trades in Cleveland, Ohio, last week, in the settlement of a controversy resulting from the refusal of the unions to abide by their agreements. Most of the building contractors in Cleveland belong to the Building Trades Employers' Association, and the various local unions in those trades are members of a general organization known as the Building Trades Council. For about two years the building contractors have recognized the unions and have made written agreements with various locals, all providing for the arbitration of differences. These agreements were lived up to by the unions until a few months ago, when the Building Trades Council decided that all contracts between unions and employers must be contingent on the will of the council. Thus the council assumed the right to order strikes at any time it saw fit. Then the unions began to violate their written agreements and to call strikes on various pretexts until the situation became unbearable. Mediation was proposed by the Cleveland Chamber of Commerce but was rejected by the unions. Peaceable means of ending the dispute proving futile, the contractors declared a lockout which affected about 20,000 men and tied up most of the building work in the city for a month.

The Building Trades Council has now yielded to the demands of the contractors for arbitration of

differences and made other important concessions. Under the terms of the agreement disputes between workmen and their employers are first to be submitted to a committee of workmen and employers in the respective trades. If this committee is unable to reach a settlement, the matter is to be submitted to a conciliation board composed of seven members of the council and seven members of the employers' organization, and there is to be no strike or lockout until this board has had ample time to investigate and to attempt to arrive at a settlement. The agreement also contains provisions that there shall be no limitation of the amount of work a man shall perform in a day; no restriction in the use of buildings, machinery and tools; no restriction in the delivery or use of any material, except it be prison-made, thus permitting employers to use material not bearing the union label; no restriction against the use of apprentices, and that employers have the right to employ and discharge whomsoever they see fit. The unions made a strenuous effort to prevent the use of open-shop building materials, but the employers stood firm, their only concession being that existing contracts relating to this matter should not be disturbed.

Necessity for Military Census

The listing of technical experts and the setting down of data on their training and experience, now being carried on by governmental and volunteer agencies, demonstrate that a vital lesson has been learned from the belligerent countries. It is emphasized by the experience of our own industries that have been engaged in munitions manufacture. The lesson is that adequate attention must be paid to determining whether certain applicants for enlistment in the field forces could not be of greater national service at home.

Connecticut has been producing, according to Governor Holcomb, 55.4 per cent of the munitions made in this country in the last two years, and in no State have the industrial leaders gained a more comprehensive knowledge of the time and effort required to organize a shop force that can produce in large quantities while maintaining high quality of product. By vote of its Legislature, Connecticut has made a military census of its entire male population and has on record the experience, present occupation and military availability of each man. It is probably true that the United States will not have occasion to call to the colors a sufficient number of men to disrupt industry, as was done in England and France. Yet it has ever been the case in American war history that skilled mechanics have been among the first to feel the urge of patriotism and present themselves for enlistment. In the present effort to increase enlistments in the army, navy and national guards of the various States, only single men are accepted, as a rule, and this serves somewhat to prevent an undue proportion of machinists and other skilled mechanics in the field forces. Yet those who have observed the class of men now enlisting, and more particularly those enrolling in the home guards being organized in so many States to replace the national guard, are impressed with the need for much discretion on the part of the officials in charge of this work.

Probably the men most interested in this phase of our preparedness campaign are the managers of the industries which will be first called upon if military activities assume the scale indicated by current events. They have watched with a feeling of dismay, almost of chagrin, the breaking up of large organizations that it took ten or twelve months to gather and which, at the end of two years or more, were only beginning to be welded into loyal and efficient producing units. For three months or more the disruption of these working forces has been going on, and as this is written the completion of foreign munitions orders is causing the laying off of thousands of hands each week. Already night shifts have almost disappeared and overtime on the day shifts will soon be rare. The March reports of the Massachusetts labor bureaus show a rapid change in the supply of machinists. The supply of tool and gage makers is not yet adequate to meet the demand, but there is a surplus of specialized machinists, such as lathe, milling-machine and drill-press operators, for the first time in many months.

The night crews of the munition shops naturally had a larger proportion of single men than the day crews, and if a hurry call is made for the products of these factories the need for discretion in the enlistment of the men who have been thrown out of work by the laying off of night crews and the reduction of day crews will be made apparent. Even without this factor, the problem of restoring the munitions shops to full production is sufficiently troublesome. The rapid introduction of new men into any organization means a period of lowered production and an increase in rejected products, as many a manufacturer who has been through strike troubles can testify. The need of a military census in advance of any great enlargement of our field forces will be brought home to all those manufacturers of such machinery and tools as enter into any form of manufacture of military equipment and supplies if the United States is called on to show the world how quickly it can put itself in condition to carry on defensive or aggressive warfare successfully.

Manganese Ore Imports Large

Manganese ore imports into the United States continue to maintain their high average. For January, 1917, these imports were 49,530 gross tons, which compares with a monthly average in 1916 of 48,027 tons, a record importation. For the seven months ended Jan. 31, 1917, the total imports were 388,828 tons, against 272,485 tons for the same period in 1916 and 158,560 tons for the corresponding seven months ended Jan. 31, 1915. The December, 1916, imports were 49,796 tons and in January, 1916, they were 16,648 tons.

The Sharon Steel Hoop Company, which recently purchased the capital stock of the Youngstown Iron & Steel Company, announces that the commercial operations of the two companies will on and after April 1, 1917, be conducted in the name of the Sharon Steel Hoop Company. All remittances and correspondence intended for either company should be addressed to the general office at Sharon, Pa. No communications in connection with the business should be addressed to individuals, all mail being addressed to the company. The personnel of the company remains identically the same as has heretofore managed the Sharon Steel Hoop Company.

HIGHER RATES ON LAKE ORE

Railroads Hope to Obtain Advance, but Protests Are Expected

WASHINGTON, April 3, 1917.—The railroads carrying iron ore from Lake ports to blast furnaces hope to obtain an advance of 15 cents a ton on that commodity from the beginning of navigation. Unless the Interstate Commerce Commission suspends the tariffs in which they have proposed the advance, the higher rates will become effective May 1.

While no formal protests have yet been made, the Commission has been informally advised that the blast furnace interests in the Mahoning and Shenango valleys and the Pittsburgh Steel Company expect to object, with the utmost vigor, on the ground that, tested by every known rule for ascertaining the reasonableness of a charge, the rates now operative are unjust and unreasonable.

Youngstown and Pittsburgh furnaces, other than those of the United States Steel Corporation and the Jones & Laughlin Steel Company have long had complaints pending, the fundamental declaration in each being that the charges to both the valleys and to the Pittsburgh district are unreasonably high because they return a greater ton-mile and greater train-mile revenue than the average of all freight, which naturally includes articles of merchandise that have a much greater per ton value than ore, or even than iron and steel.

Statisticians for some of the big furnace interests have prepared figures tending to show, they claim, that even if it be assumed that iron ore should bear the whole cost of the advances in trainmen's wages, instead of having the cost distributed over all-freight and passenger business, the imposition of three cents per ton would be more than enough to meet this increase. Whether these figures will be filed cannot now be stated. There is a decided conflict of interest, even among the blast furnace men in the Pittsburgh district, produced by Commissioner Harlan's tentative report on the iron ore rate investigation, in which he recommended the stating of rates in detail in accordance with the English system, instead of according to the American method of one rate for a unified service from the rail of the vessel to the unloading trestle, in the case of direct ore, and from the dock to the unloading vessel in the case of indirect or dock ore. Should the scheme of stating rates be adopted, in accordance with Mr. Harlan's recommendation, some of the Pittsburgh furnaces will obtain their ore at a cost only slightly greater than they have been paying. Others, however, will have to pay from 12 to 16 cents per ton more, making an increase in pig-iron production cost estimated at from 25 to 30 cents.

Commissioner Harlan, in his tentative report, promised to have the whole subject disposed of in time to have so-called English tariffs in effect by April 1, but he has not made good on that pledge. Nothing has been done, so far as the public has been advised, and the opening of the season of navigation is so near at hand that such tariffs could be made operative in time for the first arrivals at the lower lake ports only on less notice than the statutory period of 30 days.

The railroads have given notice that they intend also to advance rates on ore from interior mines, but if such tariffs have been filed they have not yet filtered through the filing system of the commission. Such tariffs, as well as those pertaining to ex-lake ore, are to constitute part of the general advance requested by carriers to recoup their increased expenses.

W. L. C.

Reinforced concrete ways 990 ft. long, fitted with electric cranes and overhead steel work, are to be provided by the Fore River Shipbuilding Corporation to facilitate building a battle cruiser which that company is to supply to the United States Government. The crane-ways 870 ft. long will carry one 50-ton and three 7½-ton cranes, all of 120-ft. span, and the larger crane 120 ft. above mean low water. The Aberthaw Construction Company is to complete the ways by Sept. 1.

NAVY DEPARTMENT ACTIVITY

Board Appointed to Supervise Compensation to Shipbuilders—Destroyer Contracts Awarded

WASHINGTON, D. C., April 3, 1917.—Secretary of the Navy Daniels has appointed a special compensation board composed of Admirals Capps, Rousseau, Taylor and Griffin and Pay Instructor Potter. Among other duties it will work out the details of the accounting systems to be used in figuring the cost of constructing battleships and other vessels building on a cost-plus-profit basis. One duty of the board will be the distribution of orders so as to interfere as little as possible with the normal business of shipbuilders and other contractors and to prevent the placing of disproportionate burdens on individual concerns.

Bids were opened and contracts awarded for 24 torpedo boat destroyers March 24, all records being broken by the manner in which the transaction was dispatched. Bids were solicited for 15 destroyers and were submitted as follows:

Union Iron Works Company, South Bethlehem, Pa.—10 vessels, duplicates of type now under contract; time dependent upon delivery of material and machinery and supply of labor available, on basis of cost-plus 10 per cent net profit. Fore River Shipbuilding Corporation, Quincy, Mass.—Class 1, 27,000 shaft hp., duplicates of destroyers Nos. 79-86 now building by company; 4, 6 or 8 vessels, delivery to be made as expeditiously as possible, cost on basis agreed upon for battle cruiser No. 1, plus 10 per cent profit.

William Cramp & Sons Ship & Engine Building Company, Philadelphia—Class 1, 27,000 shaft hp., 2 vessels, \$1,450,000 each; 4 vessels, \$1,420,000 each; 6 vessels, \$1,400,000 each. To be delivered as expeditiously as possible. For substitution of open-hearth steel castings for steel forgings for rotating parts of turbines for machinery installation deduct \$10,000 for each vessel. Alternate bid, class 1, 27,000 shaft hp., 2, 4 or 6 vessels for cost plus 10 per cent profit.

Secretary Daniels called in the representatives of the bidders and informed them that it had been decided to order 9 in addition to the 15 destroyers appropriated for by Congress, paying for them out of the emergency fund appropriated at the last session. He was prepared, he said, to award the 24 destroyers at once, provided the shipbuilders would take them on a basis of cost plus a profit of 10 per cent. After some discussion they agreed to the proposal, whereupon the Secretary awarded contracts for 10 destroyers to the Union Iron Works Company, 8 to the Fore River Shipbuilding Corporation, and 6 to the William Cramp & Sons Ship & Engine Building Company.

Contracts for the construction of a large number of submarine chasers of the 110-ft. type have been awarded to several private shipbuilding concerns. These boats are to be built on the designs upon which 64 similar craft are now being constructed at the New York and New Orleans navy yards. The identity of the successful bidders and the prices to be paid are withheld by the Navy Department for the present. Additional awards for the construction of these boats will soon be made, and naval officials are anxious to get into touch with the largest possible number of shipbuilders equipped to construct this type of craft. Only a few hundred have been contracted for, and the Navy Department hopes ultimately to secure 1500 or 2000.

The Secretary of the Navy is giving serious consideration to the purchase of four submarines which have just been finished for Great Britain by the Fore River Shipbuilding Corporation, Quincy, Mass. These boats are at the Boston Navy Yard, and are said to be of the latest design. Fore River built 10 submarines for the British Government, but inasmuch as the neutrality laws forbade their delivery while the war was in progress, and while the United States remained a neutral, arrangements were made for the sale of six of these boats to the Chilean Government. The contract price of these boats is understood to be about \$500,000 each.

The Navy Department has awarded to the American Steel & Wire Company a contract for 100 steel cable anti-submarine nets at \$1881 each. The nets are to be of a 12-ft. mesh, 1500 ft. long by 4 ft. deep. Deliveries

will begin April 20 at the rate of 10 nets per week. These nets will be used in guarding entrances to harbors and will also be used for the capture of submarines by seining suspected waters with the aid of aeroplanes which, even flying at a great height, are able to locate submersibles lying at a considerable depth.

The Navy Department announces that within a few days a decision will be reached as to the location of the Government armor-plate plant and projectile factory, which are to be built on the same site. It is probable that Congress will be asked to add substantially to the \$11,000,000 appropriation made a year ago, as the experts are all agreed that it will be impossible to build a factory capable of producing 20,000 tons per annum with the fund at the department's disposal.

The committee recently appointed by the National Chamber of Commerce to co-operate with the quartermaster-general of the army in the purchase of army supplies, and to institute a campaign against excessive war profits, held a fully attended meeting here yesterday and subsequently conferred at length with officials of the War Department. The members of the committee, representing all sections of the country, are now closely in touch with the army supply situation, and will be of great assistance to the Government in securing active competition, early deliveries, and reasonable prices. The plan of the committee will be to limit manufacturers having war contracts to a small guaranteed profit, which it is claimed will "stabilize industrial credit and effect the complete elimination of stock market speculation." The committee will make a special effort to interest manufacturers and dealers who are not now bidding on Government contracts.

At the request of the Council of National Defense, the Bureau of Mines has begun a census of technical experts whose services may be called upon to assist the Government in the event of war. Letters have been sent to mining corporations soliciting information as to the qualifications and nationality of their technical employees. The American Institute of Mining Engineers and the American Chemical Society are co-operating in this work. The information obtained as the result of this census will be turned over to the War Department, which will make every effort to utilize this technical skill in the event of hostilities and to prevent these experts from wasting their peculiar abilities by enlisting as soldiers.

Chairman Denman, of the United States Shipping Board, has authorized a statement to the effect that American vessels engaged in carrying cargoes to foreign ports are not to be commandeered by the Government, according to present plans. Neither the Shipping Board nor the Navy Department is disposed to interfere with the conduct of the sea commerce of the United States unless military necessity shall require. Vice-chairman Brent of the Shipping Board, accompanied by J. Y. Underwood, a former naval architect, and now retained by the board as an expert in wooden ship construction, have gone to the Pacific coast to consult with shipbuilders as to the possibility of building a large number of small wooden cargo vessels of from 3000 to 4000 tons each. They will also consult with lumbermen, as it has been ascertained that seasoned hardwood needed for the building of vessels of this type in Atlantic yards will have to be brought from the Far West.

The plans of the Department do not now contemplate the utilization of any considerable number of merchant vessels as supply ships or colliers. A special board of naval officers has been appointed to consider this phase of preparedness, and will co-operate with the Shipping Board in whatever is done. The present plans for a defensive war do not involve much use of capital ships.

W. L. C.

In the matter of engineering service to the Government, the Cleveland Engineering Society is planning to file with the War Department a statement of the experience and qualifications of its members for work as engineers and manufacturing experts in the preparation of munitions and of war supplies generally. Presumably the information will be collected by a circular from the society to its members.

BETHLEHEM PLAN APPROVED

Stockholders Indorse Action of Directors—
Schwab Defends Bonuses

At a meeting of the stockholders of the Bethlehem Steel Corporation, held at Newark, N. J., April 3, approval was given of the action of the directors in making an agreement with J. & W. Seligman, bankers, to underwrite the issue of \$15,000,000 new Bethlehem Steel common stock recently sold under the capital readjustment plan. The directors were authorized by the stockholders to issue bonds not to exceed \$200,000,000. It was developed that several of the directors participated directly or indirectly in the underwriting of the new issue of common stock and received commissions for their service. Clarence H. Venner of the General Investment Company of Maine objected to that action of the directors and to nearly everything else that was done at the meeting, and was promptly overruled. He proposed J. P. Morgan, Henry P. Davison, Charles Steele and William H. Porter as directors, but they were defeated by Harry Bronner, C. Austin Buck, Allan A. Ryan and Charles M. Schwab, who were re-elected.

President Grace intimated that it was the expectation of the directors to dispense with the holding company eventually and consolidate all the Bethlehem properties into one concern. Business on the books of the corporation now amounts to about \$250,000,000 compared with less than \$200,000,000 at the close of 1916.

Mr. Venner severely criticised the bonus system of paying employees, and Chairman Schwab in replying said:

"During the last six years I have had a good opportunity of seeing the benefit to employees and to the business of the bonus system, and I am convinced that the great prosperity of Bethlehem Steel is due to it. It has been a good many years since I have been in control of steel manufacturing property. Thirty years ago, when I managed the Homestead works, I introduced the bonus system, and when I became president of the Carnegie Steel Company practically the same system was introduced. The Carnegie bonuses aggregated sometimes as high as 49 per cent, whereas the bonuses given to the Bethlehem Steel employees never averaged higher than 8 per cent. Comment has been made on the size of last year's and the present year's bonuses, amounting to nearly 8 per cent, and some suggestions made that the same should be reduced in time of high wages and great prosperity. If I were one of the men, and was asked to have my bonus decreased in times of prosperity, I would certainly expect it to be increased in times of adversity."

Coke Rates Effective

WASHINGTON, April 3, 1917.—The Interstate Commerce Commission has refused to suspend the tariffs of the Chesapeake & Ohio and Norfolk & Western Railways naming increases in rates on coke varying from 10 to 65 cents per ton from West Virginia ovens to Virginia furnace points, and those tariffs, therefore, become effective April 1.

The commission has also decided to authorize increased rates on bituminous coal from West Virginia and Pennsylvania coal fields to tidewater. The rates from West Virginia fields are increased 10 cents per ton, effective April 1, and from Pennsylvania fields 5 cents per ton, effective April 16.

Orders for Locomotives

The Chicago & Northwestern has ordered 50 Mikado and the South African Railways 8 Mallet locomotives from the American Locomotive Company. An order-in-council has been passed at Ottawa, Canada, authorizing the purchase of 50 more locomotives, 25 for the Intercolonial Railway and 25 for the National Transcontinental Railway. The Canadian Locomotive Works will build these locomotives. Orders for March are estimated at 232, bringing the total locomotives ordered in the first three months of 1917 to 1338, of which 271 are for export.

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WAGES AGAIN ADVANCED

United States Steel Corporation Announces Increase of 10 Per Cent

Chairman E. H. Gary of the United States Steel Corporation made the following announcement April 3:

"It has been decided to increase about 10 per cent the wage rates and the salaries, up to \$2,500, of the employees of our subsidiary companies, to take effect May 1, 1917. Equitable adjustments will be made."

This is the fourth advance that has been made by the corporation since Jan. 1, 1916. The number of employees in 1915 was 191,126, and the salaries and wages paid amounted to \$176,800,864, while in 1916 the number of employees was 252,668, and the amount paid to them was \$263,385,502. The number of employees is now probably somewhat larger, and the increase will add about \$30,000,000 to the annual payroll. It is expected that a similar advance will be made by independent companies.

National Foreign Trade Council Meeting

At a special meeting of the National Foreign Trade Council held at India House, New York, March 30, 25 members were present, representing many lines of activity in foreign trade, while others telegraphed from distant points that they were unable to attend but wished to concur in any action that might be taken. James A. Farrell, president of the United States Steel Corporation and chairman of the council, presided. One resolution called attention to the fact that the tonnage of foreign vessels available for trade between the United States and neutral countries is decreasing more rapidly than American tonnage is increasing and the naval and military needs for merchant tonnage may be extensive, necessitating a further reduction in the shipping available for American export and import trade. The President, Congress and all departments, boards and commissions having jurisdiction in such matters were urged to devise a method of co-operation with those engaged in foreign trade and shipping whereby the tonnage available for established trades may be conserved to the interest of economic as well as military defense.

The Webb bill authorizing exporters to combine to carry on trade with foreign nations was again indorsed and Congress was urged to pass the bill at the special session.

Plea for Americanization

C. S. Robinson, second vice-president and general manager of the Youngstown Sheet & Tube Company, Youngstown, Ohio, recently delivered an address when watches were presented to foremen and superintendents having made records during the last "safety week." Mr. Robinson spoke at length of the relations of employers and employees. He made a strong point in indorsing the Americanization movement, saying he was glad to know that so many of the employees of the company were taking lessons in English. "This is excellent," he said. "But we need some Americanization ourselves. It seems to me that we have a lot to learn about how to treat these people from other shores and that we are not learning it as rapidly as we might. Let us Americanize some of our Americans as well as the foreigners."

Mr. Robinson announced that in connection with the bettering of conditions for employees the company had formed a plan "for providing homes for those who seek to become citizens and wish to do the right thing." A land company has been organized and details will be worked out more fully at a later day.

The office of the American Commission of the General Russian Countries and Towns Union has been removed from 411 Broadway, Paterson, N. J., to room 819, Flatiron Building, Broadway and Twenty-third Street, New York City.

Labor Notes

With the completion of munitions contracts by a number of plants in the Central West, the readjustment of wages that was bound to develop as soon as conditions in the labor market became more normal, is now taking place. Men who have been getting fat pay envelopes in munitions plants are now being forced to seek employment in other metal-working establishments, where they are readily finding places at the going rate of wages in such trades. Munitions workers who have been getting about \$5.50 a day are taking employment in other shops at around \$4.50. This labor is quickly absorbed, as the demand for good mechanics in the Central West is still in excess of the supply. However, the labor situation, as it applies to metal-working shops, is apparently not as acute as it has been for many months. This is doubtless partly due to the release of large numbers of the class of workers mentioned.

Labor Troubles in New England

The strikes in various foundries in the Springfield district have been settled by an agreement between the employers and the Molders' Union to submit the differences to arbitration. The demands of the men were for \$4.25 a day, the 8-hr. day and certain other minor changes in working conditions.

The Molders' Union in Boston has demanded an increase in pay from \$4 to \$4.50 a day. The 8-hr. question has not been brought into the discussion. Conferences are in progress and it is expected that this week will find the issue decided.

The patternmakers in Bridgeport, Conn., went on strike March 27, demanding an increase in rates from about 55c. an hr. to 62½c. an hr. for an 8-hr. day. Eight shops are affected, but the large employers have announced that they have no intention of complying with the demands of the strikers.

Other Points

A strike which has been in progress for some time in the shop of Maher & Flockart, Newark, N. J., is at an end so far as the company is concerned, according to a statement made by a representative of the National Founders' Association, which has furnished Maher & Flockart with more than 50 foundry men. Hereafter the company will conduct an open shop.

Operations have been resumed at the plant of the Massillon Rolling Mill Company, Massillon, Ohio, where a strike has been in progress for several weeks. The company has increased the wages of its hot-mill men 12 per cent; its sheet-mill men have been given an advance of 25 per cent and the tin-mill men 23 per cent over the base scale.

The Marion Steam Shovel Company, Marion, Ohio, has advanced the wages of its employees who work on the hour basis 10 per cent, the extra wages being payable quarterly. Over 1400 men are benefited.

Pipe and Supplies Association

The next annual meeting of the National Pipe and Supplies Association will be held at the Bellevue-Stratford, Philadelphia, May 9 and 10. Jobbers of Philadelphia and representatives of 10 of the manufacturers of wrought pipe have formed a local committee for the entertainment of the convention, which will include a trip to Valley Forge and other pleasant features.

The American Can Company has completed an arrangement with the Russian Government, it is understood, whereby deliveries of shells under a \$35,000,000 contract entered into more than a year ago, can be continued to Aug. 31 instead of April 30. The company is to receive pay for finished shell bodies as fast as completed, without waiting until the shells have been accepted by the Russian inspectors. It is reported that similar agreements are being negotiated by the General Electric Company and the Worthington Pump & Machinery Company.

Pittsburgh and Nearby Districts

The Union Switch & Signal Company, Swissvale, Pa., advises the trade that the fire of Feb. 10, which destroyed its main shop did not reach the building occupied by its forge, foundry and power house, and that its productive capacity for forgings has not been affected or interrupted. The forge plant, which is 120 x 432 ft., makes forgings for automobiles and tractors and a general line of railroad work. It is equipped with two 350-ton hydraulic forging presses and a full assortment of drop hammers from 3000 lb. down to 80 lb. The company's foundry is 180 x 520 ft., of steel and brick construction, equipped with three cupolas, with a capacity of 120 tons of metal per day, single turn. The production consists of gray-iron, mild steel, brass, aluminum and bronze castings.

The Pittsburgh Iron & Steel Foundries Company, Pittsburgh, Pa., is considering plans for remodeling its power house at Midland, Pa. Barton R. Shover, consulting engineer, Pittsburgh, has been retained to take charge of the undertaking.

The new No. 10 100-ton open-hearth furnace in the plant of the Youngstown Sheet & Tube Company at East Youngstown, Ohio, was put in operation last week. Two other furnaces of the same capacity are nearly completed and will be ready to make steel about May 1. The management of this company, being satisfied that severe winter weather is over, has dispensed with the retail coal department it started last fall, by which it furnished coal to employees at \$4 per ton, while retail coal dealers in Youngstown were charging as high as \$7.50.

The United States Steel Casting Company, New Cumberland, W. Va., has been incorporated with a capital of \$1,000,000 by Samuel Ungerleider, Columbus, Ohio; J. J. Goldsmith, Pittsburgh, and G. L. Dambrick, New Cumberland.

The Turner-Fricke Gas Engine Company, Sharon, Pa., has awarded a contract for the erection of a new foundry, 60 x 100 ft., and will need considerable foundry equipment.

The War Department, Washington, D. C., has ordered that all bridges spanning the Allegheny River at Pittsburgh be raised in order to allow free navigation on that stream. Five are owned by Allegheny County and one by the Pennsylvania Railroad. It is probable that four of the county bridges will have to be rebuilt, taking 50,000 to 60,000 tons of steel. It will not be known until plans are made how much steel will be needed for the other raised structures.

The Carbon Steel Company, Pittsburgh, paid April 1 \$700,000 of the 20-year 6 per cent first and second mortgage bonds of the Carbon Iron Company, extended by agreement to 1917. Retirement of these bonds leaves only \$343,000 bonds outstanding, and these do not mature until 1932. Cash in the treasury after payment of the bonds was about \$900,000.

The Ohio Shovel & Stamping Company, Dover, Ohio, has been sold to Pittsburgh interests, and it is reported that the plant will probably be dismantled and moved to Pittsburgh.

The John H. Pauley Machine Company, Youngstown, has been incorporated, with a capital stock of \$10,000, by John H. Pauley and others, and will engage in general machine shop work in a plant on East Boardman Street.

The G. R. Wilmarth Company, Kenton, Ohio, has established a gray-iron foundry and metal pattern shop in the plant formerly occupied by the Kenton Gas Engine Company. The company has a capital stock of \$12,000 and G. R. Wilmarth is its president.

The Erie Forge Company, Erie, Pa., is having plans prepared for a large addition to its plant.

Starting April 16, there will be shown in the Mutual Circuit theaters moving pictures illustrating the manufacture of wrought-iron pipe as made in the mills of A. M. Byers & Co., Inc., Pittsburgh. The process of making wrought-iron pipe from the ore to the finished product, ready to load on the cars, will be given minutely. These pictures will also be shown

at entertainments of various kinds, and likely also at conventions of engineering societies.

The Westinghouse Machine Company, East Pittsburgh, which has been making munitions in a plant located on Twenty-eighth Street, Pittsburgh, has completed its contracts and has laid off about 1200 men. The 7-in. shells weighed 196-lb. each and over 200,000 were made at this plant, which was built especially for their manufacture.

The Hussey-Binns Steel Company, Pittsburgh, works at Charleroi, Pa., will install two 6-ton Heroult electric steel furnaces, using cold scrap for the making of special steels. The company has one 6-ton Heroult furnace now in use.

American Iron and Steel Institute Membership

At the meeting of the board of directors of the American Iron and Steel Institute March 28, Alva C. Dinkey, president Midvale Steel Company, was elected a director of the institute to succeed E. C. Felton, resigned. The following applicants were elected to the membership waiting list:

Frederick W. Cohen, works manager Goldschmidt Thermit Company, 120 Broadway, New York.

W. F. Ripberger, assistant to vice-president Goldschmidt Detinning Company, 120 Broadway, New York.

Henry Gulick, president Gulick Henderson Company, 21 Park Row, New York.

Samuel S. Buckley, president Onondaga Steel Company, Inc., Syracuse, N. Y.

John D. Newton, president Virginia Iron, Coal & Coke Company, Roanoke, Va.

David D. Hull, vice-president Virginia Iron, Coal & Coke Company, Roanoke, Va.

Cecil E. Bertiz, assistant to the president Virginia Iron, Coal & Coke Company, Roanoke, Va.

Joseph F. Savage, general manager of sales American Tube & Stamping Company, Bridgeport, Conn.

Joseph Becker, superintendent of operation H. Koppers Company, Pittsburgh, Pa.

Horace C. Porter, chemical engineer H. Koppers Company, Pittsburgh, Pa.

John W. Kiser, Jr., president Phoenix Horse Shoe Company, 52 Vanderbilt Avenue, New York.

Loading and Unloading Charges

WASHINGTON, April 3, 1917.—The Interstate Commerce Commission has rendered a decision canceling a proposed change in the rule of the Western classification relating to the assessment of loading and unloading charges on less-than-carload shipments transported at carload rates. The proposed amendment was designed to apply to all merchandise. The present rule provides a charge of 1½c. per 100 lb. for loading and a like charge for unloading such shipments, but does not state in specific terms whether such charges will be based on actual weights or on minimum carload weights. In the proposed rule it is provided that such loading and unloading charges will be based upon the minimum carload weights. Numerous protests were made against this proposed change and the provision was therefore suspended.

If the compensation received by the carriers is insufficient to cover the cost of the service, the commission says, the method proposed is not the proper course to remedy that condition. This is taken to be an intimation that the commission will consider an increase in the charge for loading and unloading.

W. L. C.

The Cunard Steamship Company, according to reports of a conference of shipbuilders in Philadelphia, has plans to place orders for 114 ships in this country. The ships would range in size from 8000 to 17,000 tons, it is said, and cost \$120,000,000. In some quarters it is believed that the completion of negotiations will depend on the outcome of amendments to the shipping board act. It is interesting to note that the shipbuilders are planning an organization to get more men into the industry.

MORE FURNACES BLOW IN

Large Increase in Pig-Iron Output

Capacity Active April 1 Indicates Further Gain This Month

Better transportation conditions, with more nearly normal coke supply, resulted in a considerable increase in pig-iron production in March. Our statistics show a total of 3,250,757 gross tons, or 104,863 tons a day, against 2,645,247 tons in the 28 days of February, or 94,473 tons a day. There was a net gain of 15 in the number of furnaces in blast, and the estimated capacity active April 1 was 107,766 tons a day for 331 furnaces, as compared with 97,167 tons a day for 316 furnaces one month previous.

Daily Rate of Production

The daily rate of production of coke and anthracite pig iron by months, from March, 1916, is as follows:

Daily Rate of Pig-Iron Production by Months—Gross Tons			
	Steel Works	Merchant	Total
March, 1916	76,274	31,393	107,667
April	77,226	30,366	107,592
May	77,706	30,716	108,422
June	76,526	30,527	107,053
July	74,397	29,620	104,017
August	74,617	28,729	103,346
September	76,990	29,755	106,745
October	81,639	31,550	113,189
November	80,141	30,253	110,394
December	74,264	28,273	102,537
January, 1917	72,394	29,249	101,643
February	65,280	29,193	94,473
March	75,731	31,132	104,863

Capacity in Blast April 1 and March 1

The following table shows the daily capacity in

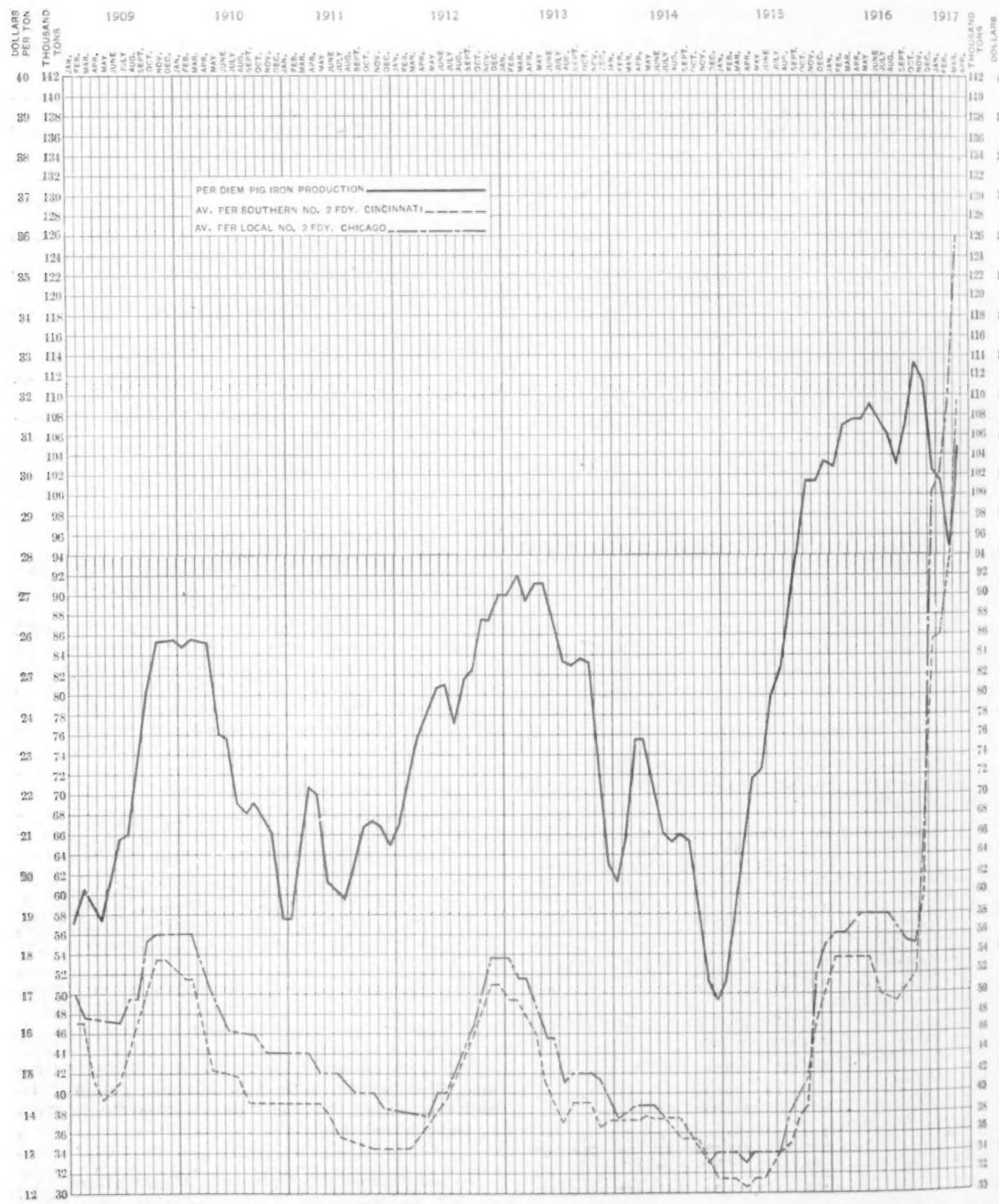


Diagram of Daily Average Production by Months of Coke and Anthracite Pig Iron in the United States from Jan. 1, 1909, to April 1, 1917; Also of Monthly Average Prices of Southern No. 2 Foundry Iron at Cincinnati and Local No. 2 Foundry Iron at Chicago District Furnace

gross tons of furnaces in blast April 1 and March 1 by districts:

Coke and Anthracite Furnaces in Blast					
Location of furnaces	Total of stacks	Apr. 1		Mar. 1	
		Number in blast	Capacity per day	Number in blast	Capacity per day
<i>New York:</i>					
Buffalo	19	16	5,358	14	4,111
Other New York	5	3	590	3	559
New Jersey	6	1	202	1	206
<i>Pennsylvania:</i>					
Lehigh Valley	21	14	4,056	13	3,651
Spiegel	2	2	186	2	196
Schuylkill Val.	12	10	2,412	10	2,610
Lower Susquehanna	7	5	1,214	5	1,245
Lebanon Valley	7	6	1,900	5	827
Pittsburgh Dist.	53	47	22,602	46	20,742
Shenango Val.	19	18	6,033	17	5,983
Western Pennsylvania	24	21	6,478	18	5,514
Maryland	3	3	1,106	3	973
Wheeling District	14	12	4,033	12	3,968
<i>Ohio:</i>					
Mahoning Val.	25	24	10,961	24	9,248
Central and Northern	26	25	9,390	21	6,898
Hocking Val. & Hang'g R'k ..	15	13	1,749	13	1,540
Illinois and Ind.	35	31	14,489	30	14,098
Michigan, Wis. & Minn.	12	11	2,602	10	2,643
Colorado & Missouri	6	4	1,217	4	1,282
The South:					
Virginia	18	10	1,260	8	1,072
Kentucky	5	3	475	4	572
Alabama	38	31	8,345	31	7,991
Tennessee	15	10	1,108	11	1,154
Total	400	331	107,766	316	97,167

Production of Steel Companies

Returns from all furnaces of the United States Steel Corporation and the various independent steel companies show the following totals of steel-making iron month by month, together with ferromanganese and spiegeleisen. These last, while stated separately, are also included in the columns of "total production."

Production of Steel Companies—Gross Tons					
	Pig, total production			Spiegeleisen and ferromanganese	
	1915	1916	1917	1915	1916
Jan.	1,115,944	2,251,035	2,244,203	18,041	24,866
Feb.	1,237,380	2,183,845	1,829,846	13,319	23,877
Mar.	1,551,082	2,365,116	2,285,645	12,274	29,388
Apr.	1,584,111	2,316,768	.....	12,337	31,862
May	1,694,290	2,408,890	.....	13,440	35,844
June	1,770,657	2,295,784	.....	19,200	38,597
July	1,949,750	2,306,303	.....	17,854	31,353
Aug.	2,101,818	2,313,122	.....	27,463	33,338
Sept.	2,129,322	2,309,710	.....	23,159	29,451
Oct.	2,281,456	2,530,806	.....	23,992	34,566
Nov.	2,198,459	2,404,210	.....	28,741	44,975
Dec.	2,283,047	2,294,620	.....	25,004	43,470

Output by Districts

The accompanying table gives the production of all coke and anthracite furnaces in March and the three months preceding:

Monthly Pig-Iron Production—Gross Tons				
	Dec. (31 days)	Jan. (31 days)	Feb. (28 days)	Mar. (31 days)
New York	154,496	159,887	135,646	176,550
New Jersey	6,610	6,347	5,765	6,271
Lehigh Valley	113,863	117,823	106,371	127,118
Schuylkill Valley	69,543	76,338	73,081	84,758
Lower Susquehanna and Lebanon Valley	73,835	74,627	62,350	69,367
Pittsburgh district	681,133	655,204	522,572	697,487
Shenango Valley	186,378	179,356	146,323	170,724
Western Pennsylvania	178,603	187,302	159,774	198,734
Maryland, Virginia and Kentucky	83,850	92,332	75,235	87,991
Wheeling district	135,102	124,505	109,236	125,021
Mahoning Valley	302,475	300,562	274,941	324,862
Central and Northern Ohio	241,935	242,342	181,263	279,124
Hocking Valley and Hanging Rock	45,819	47,948	43,131	49,517
Chicago district	503,309	475,803	389,557	438,975
Mich., Minn., Mo., Wis. and Col.	128,293	126,352	107,257	120,804
Alabama	238,558	249,694	222,246	258,695
Tennessee	34,849	34,516	31,399	34,759
Total	3,178,651	3,150,938	2,645,247	3,250,757

Among the furnaces blown in between March 1 and April 1 were two Lackawanna and one Susquehanna in the Buffalo district, one Bethlehem and one Crane in

the Lehigh Valley, one Steelton in the Lower Susquehanna Valley, one Colebrook in the Lebanon Valley, one Duquesne in the Pittsburgh district, one New Castle and Sharon in the Shenango Valley, one Josephine, Marshall and Scottdale in western Pennsylvania, Alleghany, one Big Stone Gap and Max Meadows in Virginia, two Ohio in the Mahoning Valley, three Lorain and one Newburgh in northern Ohio, one Marting in the Hanging Rock district, one Gary in the Chicago district and Wayne in Michigan.

The furnaces blown out last month include one Steelton in the Lower Susquehanna Valley, Sharpsville in the Shenango Valley, Princess in Virginia, one Ashland in Kentucky, Hamilton in the Hanging Rock district and Cumberland in Tennessee.

The Record of Production

Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1913—Gross Tons					
	1913	1914	1915	1916	1917
Jan.	2,795,331	1,885,054	1,601,421	3,185,121	3,150,938
Feb.	2,586,337	1,888,670	1,674,771	3,087,212	2,645,247
Mar.	2,763,563	2,347,867	2,063,834	3,337,691	3,250,757
3 mos.	8,145,231	6,121,591	5,340,026	9,610,024	9,046,942
Apr.	2,752,761	2,269,655	2,116,494	3,227,768	.....
May	2,822,217	2,092,686	2,263,470	3,361,073	.....
June	2,628,565	1,917,783	2,380,827	3,211,588	.....
July	2,560,646	1,957,645	2,563,420	3,224,513	.....
Aug.	2,545,763	1,995,261	2,779,647	3,203,713	.....
Sept.	2,505,927	1,882,577	2,852,561	3,202,366	.....
Oct.	2,546,261	1,778,186	3,125,491	3,508,849	.....
Nov.	2,233,123	1,518,316	3,037,308	3,311,811	.....
Dec.	1,983,607	1,515,752	3,203,322	3,178,651	.....
Total, yr.	30,724,101	23,049,752	29,662,566	39,029,356	.....

The figures for daily average production, beginning January, 1910, are as follows:

Daily Average Production of Coke and Anthracite Pig Iron in the United States by Months Since Jan. 1, 1910—Gross Tons										
	1910	1911	1912	1913	1914	1915	1916	1917		
Jan.	84,148	56,752	66,384	90,172	60,808	51,659	103,746	101,643		
Feb.	85,616	64,090	72,442	92,369	67,453	59,813	106,456	94,473		
Mar.	84,459	70,036	77,591	89,147	75,738	66,575	107,667	104,863		
Apr.	82,792	68,836	79,181	91,759	75,665	70,550	107,592	.....	
May	77,102	61,079	81,051	91,039	67,506	73,015	108,422	.....	
June	75,516	59,585	81,358	87,619	63,916	79,361	107,053	.....	
July	69,305	57,841	77,738	82,601	63,150	82,691	104,017	.....	
Aug.	67,963	62,150	81,046	82,057	64,363	89,666	103,346	.....	
Sept.	68,476	65,903	82,128	83,531	62,753	95,085	106,745	.....	
Oct.	67,520	67,811	86,722	82,133	67,361	100,822	113,189	.....	
Nov.	63,659	66,648	87,697	74,453	50,611	101,244	110,394	.....	
Dec.	57,349	65,912	89,766	63,987	48,896	103,333	102,537	.....	

Diagram of Pig-Iron Production and Prices

The fluctuations in pig-iron production from January, 1909, to the present time are shown in the accompanying chart. The figures represented by the heavy lines are those of daily average production by months of coke and anthracite iron. The two other curves of the chart represent monthly average prices of Southern No. 2 foundry pig iron at Cincinnati and of local No. 2 foundry iron at furnace at Chicago. They are based on the weekly market quotations of THE IRON AGE.

Blast Furnace Notes

The Alleghany Ore & Iron Company blew in its furnace at Iron Gate, Va., March 28. It expects to blow in its furnace at Buena Vista, Va., about April 15.

The Bethlehem Steel Company blew out E furnace at Steelton, Pa., for relining and repairs, March 25. A new furnace, known as B, has been added to this group, and was blown in March 22, making six furnaces at the Steelton plant.

Silver Run furnace of the Matthews Iron & Mining Company, Rome, Ga., will be blown in about May 15.

On April 2 the Carnegie Steel Company had no blast furnaces banked for lack of coke. It had 8 stacks idle, these being one Edgar Thomson, Niles, Neville Island, Steubenville, Edith, Zanesville and Bellaire. In March the company blew in 4 stacks—New Castle, Sharon, Isabella and Bellaire.

The old charcoal iron furnace at Grand Rivers, Ky., has been purchased by J. A. McAdams, Scottsville, Tenn. He may move it to another location, having recently acquired a large body of iron-ore land in Lyon County.

Iron and Steel Markets

GOVERNMENT DEMAND

Further Conference of Steel Makers

Prices Still Advancing in Pig Iron and Finished Lines—Large Gain in March Production

The stirring events of the week have put ordinary trade considerations in the background. But leaders in the steel industry, the Government's main war resource, have been busy finding ways to put their product and the best service of their plants at the country's disposal.

There was further conference in New York Tuesday between the steel manufacturers' committee and the metals commissioner of the Council of National Defense. It is probable that the Government will buy in the near future for its own wants and those of shipyards which are to do its work, 500,000 tons of plates, shapes and bars. Substantial concessions are to be made from current prices, but the proposal to take a ten-year market average was not adopted, as that would represent less than cost to companies not owning their own ore and coal.

The problem is not as simple as it looks to be, or as the precedent of a 50 per cent cut in the copper price would suggest. Copper at one-half off the market still gives 100 per cent profit to many producers. A steel plate price of 3c., instead of 6c., would mean a fraction of a cent above cost to a mill paying \$35 a ton for basic pig iron. The integrated companies could only stand it by telescoping the profits now made on coke, pig iron and ingots.

Government needs can be handled for the present without serious interference with ordinary trade; but while war requirements are only a small percentage of the total steel output they represent a much larger proportion of the plate tonnage, and some plate users may have to stand aside.

What gives steel producers concern is the extent to which Government buying will include finished steel for various industries with which the Government will make contracts. The concessions the Government will ask from these latter will call in turn for concessions on steel, and the trade is quite in the dark to-day as to the ultimate effect of these widely ramifying influences upon the price structure.

Buyers of war steel for Europe have already inquired whether orders placed by the United States Government will delay deliveries of war steel for export. The answer is found in the announced purpose of this Government to put its resources at the Allies' disposal to the fullest extent. Domestic consumers recognize that some export business that has not been entertained heretofore must now be given a place at the mills. Only time will show its volume.

Until various uncertainties are cleared, mills in the lines specially affected by Government demand discourage buying. Meanwhile market prices advance with even greater ease than was the case at much lower levels. Machine tool prices in various lines are reported also to have moved up an average of 10 per cent.

Wrought pipe continues its upward movement by

leaps and bounds. One independent maker announced a \$10 advance March 26. The National Tube Company and others put out new discounts April 2 representing \$10 a ton higher for steel pipe, black and galvanized. On iron pipe the last advance is \$12 and on extra strong, \$14.

Cast iron pipe, which not so long ago was advancing by 25-cent steps, is now well adjusted to the new pace, the price going up \$3 a ton in the past week or to \$50.50, New York, for 6-in. heavy pipe.

In fixing \$7.50 a box as the price of tin plates for the second half, against \$5.75 for the first half, the chief producer has come short of the expectations of some independent companies which had set out to ask \$8. It is a question now how much tin plate can be had at \$7.50 by buyers not already covered by provisional contracts. Buyers rather than sellers may make the market, in a way that is quite familiar.

The leading sheet producer opened its books April 2 for the second half of the year at 4.95c. for No. 3 to No. 8 gage, blue annealed, 5.50c. for No. 28 Bessemer black sheets, 7c. for No. 28 galvanized, and 5.50c. for No. 28 tin mill black plate.

March was the best month for steel works and blast furnaces, in point of output, since November, an indication of definite betterment in car movement. Pig iron production for the month was 3,250,757 tons, or 104,863 tons a day, the highest rate since November, and comparing with but 2,645,247 tons in February, or 94,473 tons a day. More blast furnaces are going in, in spite of costly coke, and 331 were active April 1, with a capacity of 107,766 tons a day, against 316 furnaces on March 1, with a capacity of 97,167 tons a day.

Pig iron buying for the first half of 1918 at prices \$4 to \$5 below the market for prompt delivery, is tapering off. But iron for 1917 advances with greater ease the higher it goes. In the past week most Northern foundry irons have sold at \$1 a ton and Southern iron at \$2 a ton higher, while Buffalo prices range from \$41 to \$45 for No. 2 X or \$2 to \$5 more than last week. Bessemer and basic irons seem headed for higher levels.

Pittsburgh

PITTSBURGH, PA., April 2, 1917.

Heavy advances in prices of iron and steel products are still the order of the day, but the advances in the past week were not so heavy nor so numerous as in the week before. Bessemer iron is up \$1 per ton, 50 per cent ferrosilicon about \$25 per ton, sheets from \$5 to \$10 per ton, while the price of \$7.50, base, on tin plate for the last half of the year delivery shows an advance of \$1.75 per base box over the price for the first half of this year. Black and galvanized iron and steel pipe is \$10 to \$12 per ton higher, and iron and steel boiler tubes are bringing unheard-of prices for fairly prompt delivery. Prompt furnace and foundry coke has gone off in price, due to the better supply of cars and increased output. Old material is holding fairly steady, with consumers not buying very heavily. The whole market is regarded as in line for further advances; while Bessemer iron has not sold above \$40 per ton in small lots at furnace, it is predicted that it will be \$50 by July 1 and also that basic will advance heavily. The output of pig iron in April, it is expected, will be large, as quite a number of idle furnaces have gone

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics

At date, one week, one month, and one year previous

For Early Delivery

Pig Iron, Per Gross Ton:	April 4, 1917.	Mar. 28, 1917.	Mar. 7, 1917.	April 5, 1916.
No. 2 X, Philadelphia...	\$40.00	\$39.00	\$34.75	\$20.50
No. 2, Valley furnace...	38.00	38.00	36.00	18.50
No. 2 Southern, Cin'tl...	35.90	32.90	29.90	17.90
No. 2, Birmingham, Ala.	33.00	30.00	27.00	15.00
No. 2, furnace, Chicago*	38.00	38.00	34.00	19.00
Basic, del'd eastern Pa.	36.00	35.00	30.50	21.00
Basic, Valley furnace...	35.00	35.00	30.00	18.25
Bessemer, Pittsburgh...	39.95	38.95	36.95	21.95
Malleable Bess., Ch'go*	38.00	38.00	34.00	19.50
Gray forge, Pittsburgh...	35.95	34.95	31.95	18.70
L. S. charcoal, Chicago...	38.75	38.75	35.75	19.75

Rails, Billets, etc., Per Gross Ton:	April 4, 1917.	Mar. 28, 1917.	Mar. 7, 1917.	April 5, 1916.
Bess. rails, heavy, at mill	38.00	38.00	38.00	28.00
O-h. rails, heavy, at mill	40.00	40.00	40.00	30.00
Bess. billets, Pittsburgh...	70.00	70.00	65.00	45.00
O-h. billets, Pittsburgh...	70.00	70.00	65.00	45.00
O-h. sheet bars, P'gh...	72.50	72.50	65.00	45.00
Forging billets, base, P'gh	90.00	90.00	90.00	67.50
O-h. billets, Phila.....	70.00	65.00	65.00	50.00
Wire rods, Pittsburgh...	85.00	85.00	80.00	60.00

Finished Iron and Steel,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Iron bars, Philadelphia...	3.659	3.659	3.409	2.559
Iron bars, Pittsburgh...	3.50	3.50	3.50	2.50
Iron bars, Chicago.....	3.25	3.10	3.00	2.35
Steel bars, Pittsburgh...	3.75	3.75	3.25	2.75
Steel bars, New York...	3.919	3.919	3.419	2.919
Tank plates, Pittsburgh...	5.75	5.50	5.00	3.50
Tank plates, New York...	5.919	5.669	5.169	3.669
Beams, etc., Pittsburgh...	3.75	3.75	3.25	2.50
Beams, etc., New York...	3.919	3.919	3.419	2.669
Skelp, grooved steel, P'gh	4.75	3.75	3.50	2.35
Skelp, sheared steel, P'gh	5.00	4.00	3.75	2.45
Steel hoops, Pittsburgh...	4.25	4.25	3.75	3.00

*The average switching charge for delivery to foundries in the Chicago district is 50c. per ton.

Sheets, Nails and Wire, Per Lb. to Large Buyers:	April 4, 1917.	Mar. 28, 1917.	Mar. 7, 1917.	April 5, 1916.
Sheets, black, No. 28, P'gh	5.50	5.00	4.75	2.85
Sheets, galv., No. 28, P'gh	7.25	7.00	6.75	5.00
Wire nails, Pittsburgh...	3.20	3.20	3.20	2.40
Cut nails, Pittsburgh...	3.75	3.75	3.70	2.30
Fence wire, base, P'gh...	3.15	3.15	3.15	2.25
Barb wire, galv., P'gh...	4.05	4.05	4.05	3.25

Old Material, Per Gross Ton:

Iron rails, Chicago.....	\$20.00	\$28.00	\$27.00	\$18.00
Iron rails, Philadelphia...	30.00	29.00	28.00	20.00
Carwheels, Chicago.....	22.50	22.00	20.00	14.00
Carwheels, Philadelphia...	25.00	23.00	20.50	17.50
Heavy steel scrap, P'gh...	27.00	27.00	22.00	18.25
Heavy steel scrap, Phila...	24.50	24.50	22.00	18.00
Heavy steel scrap, Ch'go	26.00	25.00	22.75	16.50
No. 1 cast, Pittsburgh...	23.00	23.00	20.00	16.25
No. 1 cast, Philadelphia...	25.00	23.00	20.00	18.00
No. 1 cast, Ch'go (net ton)	19.25	18.25	16.50	13.00
No. 1 RR. wrot, Phila....	34.00	33.00	29.00	18.50
No. 1 RR. wrot, Ch'go (net)	29.50	27.50	25.00	17.00

Coke, Connellsville, Per Net Ton at Oven:

Furnace coke, prompt...	\$7.50	\$8.00	\$10.00	\$2.75
Furnace coke, future...	7.00	7.00	7.00	2.90
Foundry coke, prompt...	9.50	10.00	12.00	3.75
Foundry coke, future...	7.50	7.50	7.50	3.50

Metals,

Per Lb. to Large Buyers:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York...	34.00	35.50	36.25	27.50
Electrolytic copper, N. Y.	34.00	35.50	36.25	27.37 1/2
Spelter, St. Louis.....	10.50	10.50	10.62 1/2	17.50
Spelter, New York.....	10.75	10.75	10.87 1/2	17.75
Lead, St. Louis.....	9.15	9.25	9.50	8.00
Lead, New York.....	9.45	9.40	9.50	8.00
Tin, New York.....	54.25	55.87 1/2	54.00	50.62 1/2
Antimony (Asiatic), N. Y.	36.00	35.00	30.00	45.00
Tin plate, 100 lb. box, P'gh.	\$8.00	\$8.00	\$8.00	\$4.50

in blast in the last two weeks. Expected heavy Government buying of steel will materially reduce the output normally available, and some large steel mills are refusing to sell anything for delivery this year, except material for specific work and to a regular customer. Sheet and tin-plate mills are allotting their output of tin plate for last-half deliveries. Several mills say that in 2 hr. they could sell, at \$9 per base box, all the tin plate they could make in last half of the year, but they intend to take care of their regular customers as best they can.

Pig Iron.—W. P. Snyder & Co. report the average price of Bessemer iron in March, based on sales of 1000 tons or over, as \$36.426 at Valley furnace, an increase over the February price of \$1.01 per ton. No sales of Bessemer iron are indicated at as high as \$40 per ton, Valley furnace. The average price of basic iron in March, also based on sales of 1000 tons or over, was \$32.537, \$2.537 higher than the February average. These are said to be the highest averages ever known in the local pig-iron market. Sales in the past week in this district were rather light, due largely to a scarcity of both Bessemer and basic. Small sales of Bessemer iron, ranging from 100 to 300 tons, are said to have been made at \$40, Valley furnace, but no sales of 1000 tons as yet have been made at that price. A local steel casting plant bought, on March 30, 2500 tons of Bessemer iron for delivery in the last half of this year, for which it is said to have paid close to \$39, at Valley furnace. Another sale of 1000 tons of Bessemer iron is reported at \$39, Valley, for second quarter delivery. An inquiry is in the market for 10,000 tons of Bessemer iron for shipment to Italy, and one concern is said to have quoted \$40, Valley, but other sellers are refusing to quote, not having the iron to spare. A local consumer is in the market for 3000 tons of Bessemer iron for the second quarter, and may possibly buy before the week is out. Sales of basic iron have been light and inquiry is not very active. The market is firm at \$35 to \$36, but so far no large sales have been made at above \$35, Valley fur-

nace. The United Steel Company, Canton, Ohio, is in the market for 5000 tons of basic for delivery over the second and third quarters. Sales of foundry iron have been fairly heavy. The Westinghouse Machine Company is said to have bought close to 10 000 tons for its Trafford City, Pa., foundry for delivery in the last quarter of this year and the first half of next year. The Westinghouse Electric & Mfg. Company is in the market for 10,000 to 15 000 tons for the last half of this year, and the Pennsylvania Railroad wants 7000 tons of foundry and carwheel iron for the last half for its Altoona foundry. Most sellers are now quoting \$40 on Bessemer iron, and as high as \$40 on foundry iron. It is said that carload lots for prompt shipment have sold at that price. We now quote: Standard Bessemer iron, \$39 to \$40; basic, \$35 to \$36; malleable Bessemer, \$37 to \$38; No. 2 foundry, \$38 to \$40, and gray forge, \$35 to \$36, with a freight rate for delivery to the Pittsburgh and Cleveland districts of 95c. per ton.

Billets and Sheet Bars.—Not much is doing in the way of new sales of billets or sheet bars, consumers being well covered. Shipments to tin-plate and sheet mill plants are now close to normal, due to the better supply of cars. Sales of discard steel are still being made in fairly large quantities at \$39 up to \$41, delivered. A sale of 1000 tons of Bessemer sheet bars for May and June delivery is reported at \$72, maker's mill. We now quote soft Bessemer and open-hearth billets and sheet bars at \$70 to \$75 per ton, maker's mill, Pittsburgh or Youngstown; forging billets, \$95 to \$100 for sizes up to but not including 10 x 10 in., and for carbons up to 0.25.

Ferroalloys.—Prices on ferromanganese are very firm. Several fair-sized lots ranging from 50 to 200 tons have been sold at \$325 per ton, delivered. Nothing is doing in foreign alloy, owing to the complications arising out of the war situation. There is a famine in the supply of 50 per cent ferrosilicon, which is said to have sold in small lots for prompt shipment at as high as \$225 per ton, delivered. We quote English 80 per cent ferromanganese at \$185 to \$200, seaboard, but with no

promise of delivery. We quote domestic 80 per cent ferromanganese at \$325 per ton, delivered. We note a sale of 50 tons of 50 per cent ferrosilicon at slightly over \$200, delivered; also a sale of 750 tons of 11 per cent Bessemer ferrosilicon at \$57.50, delivered.

Structural Material.—New inquiry is still quite heavy, in spite of the high prices ruling. The McClintic-Marshall Company has taken 400 tons for a new shop for the Standard Steel Car Company, at Butler, Pa. The United States Steel Products Company has closed for 1500 tons of bridge work for export to Norway, likely to be fabricated by the American Bridge Company. The Riverside Bridge Company has been awarded 3000 tons for a power house in Wheeling, W. Va. Inquiries in the market include 700 tons for a power house at the new Essington, Pa., shops of the Westinghouse Electric & Mfg. Company, and 1200 tons for a new factory for the Hershey Company in Cuba. We quote beams and channels up to 15 in. at 3.60c. to 3.75c. for extended delivery, while small lots from warehouse are quoted at 4.25c. to 5c., depending on quantity.

Plates.—A local mill has advanced its price on ¼-in. and heavier sheared plates to 6c. at mill, for delivery in the last quarter of this year, and will not shade that price. Ship plates have sold at 8c. to 9c., and it is predicted they will go to 12c. or higher. Orders for steel cars are light, and there is not much new inquiry. The Standard Steel Car Company will build 300 freight cars for the Maine Central and 1000 steel tank cars for the Union Tank Line. It is difficult to quote the market on plates, as prices are advancing rapidly. At this writing the minimum price on ¼-in. and heavier sheared plates is 5.50c. to 6c. at mill, and on ship plates from 8c. to 9c. at mill. Small lots of 1-in. and heavier sheared plates for fairly prompt shipment would readily bring above 6c. at maker's mill.

Sheets.—Effective April 2, the American Sheet & Tin Plate Company opened its books on orders for sheets for the third quarter and second half of the year delivery. The company fixed its prices on blue annealed No. 3 to No. 8 gage at 4.95c.; American Bessemer black, No. 28, at 5.50c.; No. 28 galvanized, 7c.; and No. 29 tin-mill black plate, at 5.50c. The company withdrew from the market several months ago as a seller of sheets for second-quarter delivery, having at that time sold its entire output up to July 1; and the prices just adopted are \$5 to \$10 per ton higher than the company was quoting at that time. The prices named apply on sheets made from Bessemer stock and are made to jobbers for delivery in third quarter and to manufacturers for delivery over the second half of this year. For sheets rolled from open-hearth stock the company is quoting \$5 per ton additional. It is thought that some of the other mills will quote even higher prices, especially if they can make deliveries late in the second quarter and early in the third. The demand for sheets is heavy, and it is said part of the large consuming trade is already covered over the second half of this year. We quote blue annealed sheets, Nos. 3 to 8, at 4.95c. to 5.50c.; box annealed, one pass Bessemer, cold-rolled, No. 28, 5.50c. to 6c.; No. 28 galvanized, 7c. to 7.50c.; No. 28 black plate, tin-mill sizes, 5.50c. to 6c.; all f.o.b. mill, Pittsburgh. These prices are for carloads and larger lots, for shipment over the third quarter and last half of this year. The higher prices given are for fairly prompt delivery.

Tin Plate.—On April 2, the American Sheet & Tin Plate Company fixed its price on No. 28 tin plate at \$7.50 per base box for delivery over the last half of this year. The other tin-plate makers have adopted the same price to govern their trade, but to some consumers will probably charge \$7.75 per base box. There is not much tin plate to sell over the remainder of this year. The consuming trade is well covered, but the mills are much behind in deliveries, and the chances are there will be a decided shortage for last-half delivery. As yet there have been no further developments growing out of the conference at Washington on March 24, held by Government representatives and the tin-plate manufacturers. The committee appointed at this meet-

ing is understood to be gathering data to be submitted at another conference, and the Government is also said to be gathering information asked for by the tin-plate makers. We now quote tin plate, 14 x 28, at \$7.50 to \$7.75 per base box for last half of the year delivery. On small current orders mills are quoting \$8 to \$8.25 for primes and wasters, per base box, at mill. We quote long-terne plate, No. 28 gage base, at \$7 to \$7.25; short-terne plate, \$11.50 to \$12, makers' mill, prices depending on quantities and deliveries wanted. The full schedule of prices adopted by the American Sheet & Tin Plate Company on terne plates is as follows: 8-lb., 200 sheets, \$14 per package; 8-lb., 214 sheets, \$14.30 per package; 12-lb., I. C., \$15.25 per package; 15-lb., I. C., \$15.75 per package; 20-lb., I. C., \$16.50; 25-lb., I. C., \$17.25; 30-lb., I. C., \$18; 35-lb., I. C., \$18.75; 40-lb., I. C., \$19.50.

Steel Rails.—No large orders are being placed for standard sections, and the mills do not want them, as their rail capacity is sold up for this year and for practically all of 1918. New demand for light rails from the coal-mining interests is fairly active, and prices are ruling very firm. We quote splice bars at 2.75c. at mill when sold in connection with orders for standard section rails, while for carloads and smaller lots up to 3c. and 3.25c. is quoted. We quote light rails as follows: 25 to 45 lb., \$55; 16 to 20 lb., \$56; 12 and 14 lb., \$57; 8 and 10 lb., \$58; in carload lots, f.o.b. mill, with the usual extras for less than carloads. Standard section rails of Bessemer stock are held at \$38, and open-hearth \$40, per gross ton, Pittsburgh.

Shafting.—Prices are very firm, makers quoting 10 to 15 per cent off list on desirable orders, while one leading maker is still quoting a minimum of 5 per cent off list. The consuming trade is well covered for the second quarter, and some over the third quarter of this year. Makers report specifications coming in freely. Deliveries on shafting can be made in 10 to 12 weeks from date of order. We now quote cold-rolled shafting from 5 to 10 per cent off list, but to a few large customers some makers might quote 15 per cent off.

Railroad Spikes and Track Bolts.—Few new orders are being placed for railroad spikes, as the railroads are well covered over the remainder of this year. Specifications against contracts are coming in freely. New demand for track bolts is active, and prices are higher. We now quote track bolts with square nuts at 5.25c. to 5.35c. to railroads, and 5.40c. to 5.50c. in small lots to jobbers, base. Railroad spikes, 9/16 in. and larger, are now \$3.65, base; 7/16 and ½ in., \$3.75 base; 5/16 and ¾ in., \$4 base. Boat spikes are \$3.90 base, all per 100 lb., f.o.b. Pittsburgh.

Wire Products.—Makers continue to report the new demand for wire and wire nails as abnormally heavy, and say they have no trouble in getting premiums of \$3 to \$5 per ton, on both nails and wire, when they can make the deliveries wanted. Specifications against contracts are heavy and mills have their entire output of nails and wire sold up over the next three or four months. The mills are refusing to quote except on specific orders and to regular customers. Prices on both nails and wire are expected to be higher in the near future. We quote: Wire nails, \$3.20 base per keg; galvanized, 1 in. and longer, including large-head barbed roofing nails, taking an advance over this price of \$2.20, and shorter than 1 in. \$2.70. Bright basic wire is \$3.25 per 100 lb.; annealed fence wire, Nos. 6 to 9, \$3.15; galvanized wire, \$3.85; galvanized barb wire and fence staples, \$4.05; painted barb wire, \$3.35; polished fence staples, \$3.35; cement-coated nails, \$3.10 base, these prices being subject to the usual advances for the smaller trade, all f.o.b. Pittsburgh, freight added to point of delivery, terms 60 days net, less 2 per cent off for cash in 10 days. Discounts on woven-wire fencing are 51 per cent off list for carload lots, 50 per cent off for 1000-rod lots, and 49 per cent off for small lots, f.o.b. Pittsburgh.

Wire Rods.—New demand is still much heavier than the supply. Almost every day local mills are turning down inquiries on which they cannot make the deliveries wanted. High-carbon special steel rods have sold all the way from \$90 up to \$110 per gross ton and it is said

that as high as \$125 has been done on acid steel rods, carbons running 0.80 to 0.90 per cent. We quote soft Bessemer open-hearth and chain rods at \$85, and high-carbon rods at \$100 to \$115 per ton, prices on the latter depending entirely on the carbons and the quality of steel demanded.

Iron and Steel Bars.—Practically the entire output of steel bars for this year is under contract. It is again strongly denied that any of the implement makers were permitted to place contracts recently for steel bars for delivery into next year. New demand for reinforcing rods is only fairly heavy, being cut down by the falling off in new building projects, as a result of high labor and material costs. There is a heavy demand for iron bars and local mills are well sold up for three to four months. We quote steel bars at 3.35c. at mill, with no promise of definite delivery, and 3.50c. to 3.75c. for shipment in two to three months. We quote refined iron bars at 3.50c. and railroad test bars 3.65c. at mill in carload lots.

Hoops and Bands.—A fairly heavy demand is noted but most consumers are covered over the second quarter at least and some over the last half of this year. The nominal price of the Carnegie Steel Company on steel bands is 3.35c., extras as per the steel bar card, but with no definite promise of delivery. Other makers are quoting steel bands at 3.50c. to 3.75c., at mill, for delivery in the third quarter and last half. Prices on steel hoops range from 4c. to 4.50c., at mill, depending on the quantity involved, the deliveries and other conditions.

Cold-Rolled Strip Steel.—Makers report their output well sold up for the second quarter, and in a few cases some of the larger users have been permitted to cover at least part of their needs for the third quarter. As yet the mills have not formally opened their books on contracts for third-quarter delivery, and say they may not for some time. Specifications are reported active but current demand is mainly for small lots for prompt shipment. For second-quarter delivery we quote cold-rolled strip steel at \$7 to \$7.25 per 100 lb. on current orders. For reasonably prompt shipment mills are getting \$7.25 to \$7.50 and higher. Terms are 30 days net, less 2 per cent for cash in 10 days, delivered in quantities of 300 lb. or more when specified for at one time.

Nuts and Bolts.—Makers report the new demand fairly heavy, but most consumers are covered over the second quarter and some for the third quarter. The export demand is active and, where bottoms can be secured, makers say there is no trouble in getting export contracts at much higher than domestic prices. In one or two cases export orders have brought close to \$20 per ton advance over domestic prices. The export demand is coming largely from South America, China, Japan and India. Shipments of several carloads of nuts and bolts were recently made to South Africa. The expected advance in prices has not yet been made. Discounts in effect at this writing are as follows, delivered in lots of 300 lb. or more, when the actual freight rate does not exceed 20c. per 100 lb., terms 30 days net, or 1 per cent for cash in 10 days:

Carriage bolts, small, rolled thread, 40 and 10 per cent; small, cut thread, 40 and 2½ per cent; large, 30 and 5 per cent.

Machine bolts, h. p. nuts, small, rolled thread, 50 per cent; small, cut thread, 40 and 10 per cent; large, 35 and 5 per cent.

Machine bolts, c. p. c. and t. nuts, small, 40 per cent; large, 30 per cent. Bolt ends, h. p. nuts, 35 and 5 per cent; with c. p. nuts, 30 per cent. Lag screws (cone or gimlet point), 50 per cent.

Nuts, h. p. sq. and hex., blank, \$2.50 off list, and tapped \$2.30 off; nuts, c. p. c. and t. sq., blank, \$2.10 off, and tapped, \$1.90 off; hex., blank, \$2.25 off, and tapped \$2 off. Semi-finished hex. nuts, 50, 10 and 5 per cent. Finished and case-hardened nuts, 50, 10 and 5 per cent.

Rivets 7/16 in. in diameter and smaller, 40 and 10 per cent.

Rivets.—While most consumers are covered over the second quarter and some for the third quarter, the new demand is still active. The export demand is strong. Several carloads of rivets were recently

shipped to Japan and South Africa. Makers quote buttonhead structural rivets, ½ in. in diameter and larger, \$4.75 per 100 lb., base, and conehead boiler rivets, same sizes, \$4.85 per 100 lb., base, f.o.b. Pittsburgh. Terms are 30 days net, or ½ of 1 per cent off for cash in 10 days.

Wrought Pipe.—On March 26 the Wheeling Steel & Iron Company lowered discounts on black and galvanized steel pipe five points, equal to an advance of \$10 per ton, and effective April 2 the National Tube Company and other makers took the same action, so that the whole market on black and galvanized steel pipe is now \$10 higher. On black and galvanized iron pipe discounts were lowered, effective April 2, six points, equal to an advance of \$12 per ton, and on extra strong and double extra strong discounts were lowered seven points, or an advance of \$14 per ton. Practically all the makers of wrought-iron pipe are out of the market and are quoting only on specific inquiries and to regular customers. Prices on all kinds of oil-country goods and also on line pipe have been advanced \$10 per ton, effective from April 2. These heavy advances emphasize strongly the condition of the pipe market, which simply is that the mills are practically sold up for most of this year. None of the makers of iron or steel pipe is able to take new lap-weld orders for delivery before October of this year. On butt-weld sizes the mills are not sold so far ahead, and can make shipments in 10 to 12 weeks. Some large inquiries are in the market for line pipe for oil and gas projects, but the mills are turning these down as they cannot make the deliveries wanted. The new discounts are given on another page.

Boiler Tubes.—The famine in the supply of boiler tubes is getting worse, and it is a question where some consumers of iron and steel tubes are going to get them. Local makers of both iron and steel tubes have been out of the market for several months as active sellers, and are quoting only on specific inquiries and to regular customers. Premiums of \$10 to \$15 per ton over what are regarded as regular prices on iron and steel tubes are willingly paid by consumers. Nominal discounts have been unchanged since November, 1916, but each maker has his own price, depending on the customer, the quantity of tubes wanted and the deliveries. The nominal discounts are given on another page.

Coke.—The supply of cars is steadily getting better, and this is reflected in lower prices on prompt furnace and foundry coke, which have gone off the past week fully \$1 per ton. Late last week sales of high grade prompt furnace coke were made at \$7.50 per net ton at oven, but the market is weaker to-day, and it is probable furnace coke could be secured at \$7. There is no demand for contract coke, consumers preferring to buy from month to month, especially as the market is showing signs of going lower. We now quote best grades of prompt furnace coke at \$7 to \$7.50, and prompt 72-hr. foundry coke at \$9 to \$9.50 per net ton at oven. The output of coke in the Upper and Lower Connellsville regions last week showed an increase over the previous week of about 7000 tons.

Old Material.—The recent advance of \$2 to \$5 per ton on nearly all grades of iron and steel scrap is holding firm and the market seems to be in line for still higher prices. Local consumers, while not buying heavily as yet, are taking more interest in the market, and are expected to buy in the near future. The scrap market in Sharon, Canton and Youngstown is much more active than the local market, and local dealers say that most of their sales in the past two weeks or more have been made in those districts. It is estimated that consumers in the Youngstown district have lately bought upward of 25,000 tons of heavy steel scrap and they have also been good buyers of borings and turnings. There is a strong local demand for low-phosphorus melting scrap, which is very firmly held. A sale of 1000 tons has been made at \$36. All embargoes on scrap in this district have been lifted. Prices for delivery in Pittsburgh and other con-

suming points that take Pittsburgh freight rates, per gross ton, are nominally as follows:

Heavy melting steel scrap, Steubenville, Foliansbee, Brackenridge, Sharon, Monessen, Midland and Pittsburgh, delivered	\$27.00 to \$28.00
No. 1 foundry cast	23.00 to 24.00
Re-rolling rails, Newark and Cambridge, Ohio, Cumberland, Md., and Franklin, Pa.	28.00 to 29.00
Hydraulic compressed sheet scrap....	20.00 to 20.50
Bundled sheet scrap, s.d.es and ends, f.o.b. consumers' mills, Pittsburgh district	17.00 to 17.50
Bundled sheet stamping scrap.....	14.00 to 14.50
No. 1 railroad malleable stock.....	23.00 to 23.50
Railroad grate bars	15.00 to 15.50
Low-phosphorus melting stock.....	35.00 to 36.00
Iron car axles	41.00 to 42.00
Steel car axles	52.00 to 55.00
Locomotive axles, steel	55.00 to 60.00
No. 1 bushing scrap.....	22.00 to 22.50
Machine-shop turnings	12.50 to 13.00
Old carwheels	22.00 to 23.00
Cast-iron borings	13.50 to 14.00
*Sheet bar crop ends.....	28.00 to 29.00
No. 1 railroad wrought scrap.....	28.00 to 29.00
Heavy steel axle turnings.....	16.00 to 17.00
Heavy breakable cast scrap.....	20.50 to 21.00

*Shipping point.

Chicago

CHICAGO, ILL., April 3, 1917.

The situation is one of suspense, pending the expected entrance of this country into a state of actual war. In this connection consideration is given not only to a wider demand, but to what may follow the withdrawal of an army of men from productive labor. Uncertainty as to future costs also continues to influence almost every phase of the market. The makers of bolts and nuts, for instance, are much concerned, not only as to the prices they will be called on to pay for bars and rods, but in the case of the latter they appear to have doubts as to whether they will be able to secure all they will need. Therefore they are resisting the importunities of railroads and agricultural implement makers that they book orders for the second half. Action in the desired direction is expected, however, about the middle of this month, and the probability is strong that nut, bolt and rivet quotations will be advanced. An important event of the week has been the entrance into the scrap market of the leading steel producer of this district. It has taken several thousand tons of heavy and shoveling melting steel, and is seeking more. It usually does not buy scrap, and its action at this time is taken to mean that it is short of pig iron. The foundries are more active purchasers of cast scrap, indicating that they are beginning to use pig iron taken at high cost. Under these influences both melting steel and cast scrap, with many other items on the list, have advanced sharply. Light rails have been advanced \$3 per ton, and spikes are higher. Some makers of tie-plates quote \$70. The strong tendency of pig iron continues. Implement manufacturers have been in the market for disks and other specialties.

Pig Iron.—The trend of prices continues upward, and in no direction is there any perceptible sign of weakness, facts of which consumers are fully aware and which account for the greater activity they are showing in making inquiry, and buying both for last-half and first-half deliveries. Several thousand tons are pending for the remainder of this year, while the inquiry for next year is increasing at a lively rate. Several thousand tons of Northern No. 2 foundry and malleable for delivery next year have been booked at \$35, Chicago. These same grades for last half delivery are quoted around \$38, with spot deliveries on record at \$39, furnace. Some 1000 and 2000 ton lots of Middlesborough, Ky., iron have been placed for 1918 delivery at \$32, furnace, this iron having an advantage of about 50c. over Alabama iron. Some smaller transactions involving the same iron and delivery are also reported. Yesterday, however, No. 2 of the make referred to was withdrawn from the market, and No. 2 plain was priced at \$33, furnace, and No. 3 foundry at \$32.50. It was understood that a prominent maker of Southern iron which has not been selling in the past two weeks would re-enter the market with a limited tonnage for disposal about April 1, but up to the

present time the contemplated action has not been taken. Prompt Southern No. 2 ranges from \$32 to \$33 Birmingham, according to analyses, with the buyer more likely to pay the latter figure, which is equivalent to \$37, Chicago. Sales of Southern iron running $3\frac{1}{2}$ per cent silicon, and $2\frac{1}{4}$ to 3 per cent silicon have been made at \$33, Birmingham. Some Southern silvers are coming into this market and are being taken around \$38, furnace. They are high in phosphorus, running 1.75 to 2 per cent. For Jackson County, Ohio, 8 per cent silvery, \$45, furnace, or \$47.50, Chicago, is quoted, although in one case, at least, the quotation is \$1 higher. The exact level of standard low phosphorus is a puzzle, but it may be stated that \$70, Valley, has been done, to which must be added a freight rate of \$2.54. Lake Superior charcoal irons are practically unchanged at \$38.75 to \$41.75, delivered, No. 6 and Scotch having been sold on the basis of \$40, furnace. March charcoal-iron sales were heavy and nearly a thousand tons has been booked this week by one interest at \$38 and \$40, furnace. Bessemer ferrosilicon, 12 per cent, has been offered at \$60, furnace, from which it may be deduced that 10 per cent is about \$56, furnace, and Chicago delivery about \$58.50. On the other hand, sales are reported of 10 per cent at \$55, furnace, making Chicago delivery \$57.50. As a matter of fact, Chicago delivery ranges from \$57.50 to \$60, with the higher quotation for second and third quarter delivery. The following quotations are for iron delivered at consumers' yards, except those for Northern foundry, malleable Bessemer and basic irons, which are f.o.b. furnace, and do not include a switching charge averaging 50c. per ton:

Lake Superior charcoal, Nos. 2 to 5.....	\$38.75
Lake Superior charcoal, No. 1.....	39.25
Lake Superior charcoal, No. 6 and Scotch	40.25
Northern coke foundry, No. 1.....	\$38.50 to 39.50
Northern coke foundry, No. 2.....	38.00 to 39.00
Northern coke foundry, No. 3.....	37.50 to 38.50
Northern high-phosphorus foundry.....	37.00 to 38.00
Southern coke No. 1 f'dry and 1 soft.....	37.00 to 38.00
Southern coke No. 2 f'dry and 2 soft.....	36.00 to 37.00
Malleable Bessemer	38.00 to 39.00
Basic	38.00 to 39.00
Low phosphorus	72.50
Silvery, 8 per cent	47.50
Bessemer ferrosilicon, 10 per cent.....	57.50

Ferroalloys.—The demand for 80 per cent ferromanganese is active. The representative of one domestic producer asks \$350 for the fourth quarter, and has no earlier to offer. For spot \$400 is reported to have been bid. Another interest is asking \$375 for any position, but admits that the market is a most uncertain one.

Rails and Track Supplies.—The Chicago, Burlington & Quincy has closed for about 10 000 tons of tie plates, and the Illinois Central for about 25,000 tons, all for 1918 delivery. A large part of these plates will be furnished under a conversion arrangement whereby railroad scrap is utilized. Otherwise there has not been much activity in this market, but prices are higher. Quotations are as follows: Standard railroad spikes, 3.70c. to 3.80c., base; small spikes, 4c., base; track bolts with square nuts, 4.60c. to 4.70c., all in carloads, Chicago; tie plates, \$60 to \$70, f.o.b. mill, net ton; standard section Bessemer rails, Chicago, \$38, base; open-hearth, \$40; light rails, 25 to 45 lb., \$55; 16 to 20 lb., \$56; 12 lb., \$57; 8 lb., \$58; angle bars, 2.75c. base.

Structural Material.—No structural undertakings of large size are before the fabricators. A superstructure for a bridge at Lawrence Avenue, Chicago, requiring 430 tons, went to the Toledo Bridge & Crane Company. The American Bridge Company will supply 269 tons of I beams and repair material to the Illinois Central for a Yazoo River bridge, also 110 tons of material to the same company for a bridge at the Walnut Street subway, Bloomington, Ill. The American Car & Foundry Company was awarded the contract for the 2000 gondola freight cars for which the Northwestern asked bids, but the cars are to be largely of wood, and will contain only a minimum amount of steel. The Philadelphia & Reading is in the market for 1000 box cars and 1000 gondolas. A good demand continues for plain material, with fabricating shops and jobbers more anxious than ever to make contracts. The quotation

for plain material, delivery at mill convenience, is unchanged at 3.789c., Chicago.

We quote for Chicago delivery of structural steel out of jobbers' stocks, 4.50c.

Plates.—While the scramble for plates is not as fierce in this territory as it is on the Atlantic seaboard, it is more than sufficient in view of the sold-up condition of the mills. A mill which has none to offer was proffered 6c., Chicago, for a round lot of mild steel plates. An inquiry which is before the makers calls for several thousand tons of tank plates, including about 300 tons of circles. For plates of this class 6c., Pittsburgh, delivery in three to four months, has been asked. Meanwhile the nominal quotation for Chicago delivery, convenience of mill, is 4.689c., and it is still probable that for widths up to 72 in., 5.189c. to 5.659c. can be done. Wide plates range from 5.689c. to 6.189c. Jobbers' quotations are unchanged.

We quote for Chicago delivery of plates out of jobbers' stocks, 5.50c.

Sheets.—The sheet mills have not opened their books for second-half business yet, but it is felt that they must do so soon. Blue annealed sheets are stronger, and it is a fair statement to say that No. 10 can no longer be had at 5c. Jobbers quote higher on black and galvanized. We quote for Chicago delivery, No. 10 blue annealed, 5.25c. to 5.50c.; box annealed, No. 16 and lighter, 5.50c., and for No. 28 galvanized, 6.75c. to 7.50c.

We quote for Chicago delivery out of stock, regardless of quantity, as follows: No. 10 blue annealed, 5.50c.; No. 28 black, 5.90c.; No. 28 galvanized, 8c.

Bars.—With a mill which is in a comparatively favorable position, the best delivery that can be made of mild steel bars is in four to six months. Mild steel is quotable at 3.35c., Pittsburgh, or 3.539c., Chicago, shipment at mill convenience, therefore a nominal quotation. Iron bars are around 3.25c., Chicago, with the mills well sold ahead, and hard steel bars are at the same level. With the approach of warmer weather and more activity in concrete work, greater activity in high-carbon bars is looked for. Shafting, in carloads, is quoted 20 per cent off, and less than carloads at 15 per cent off.

We quote prices out of store for Chicago delivery as follows: Soft steel bars, 4.25c.; bar iron, 4c.; reinforcing bars, 4.25c., base, with 5c. extra for twisting in sizes $\frac{1}{2}$ in. and over and usual card extras for smaller sizes; shafting list plus 5 per cent.

Rivets and Bolts.—The advancing prices of bars and wire rods contribute to an extremely strong market. Most of the railroad and implement makers are endeavoring to cover their last-half requirements, but the bolt makers are not expected to consider the importunities of their customers until about the middle of this month, and when they do it probably will be at advances over existing prices. The bolt makers have doubt as to their ability to secure all the material they will need, being especially concerned over wire rods. Meanwhile, nominal quotations are as follows: Carriage bolts up to $\frac{3}{4}$ x 6 in., rolled thread, 40-10; cut thread, 40-2 $\frac{1}{2}$; larger sizes, 30-5; machine bolts up to $\frac{3}{4}$ x 4 in., rolled thread, with hot-pressed square nuts, 50; cut thread, 40-10; large size, 35-5; gimlet-point coach screws, 50; hot-pressed nuts, square, \$2.50 off per 100 lb.; hexagon, \$2.60 off. Structural rivets, $\frac{3}{4}$ to 1 $\frac{1}{4}$ in., 4.75c. to 4.939c., base, Chicago, in carload lots; boiler rivets, 10c. additional.

Store prices are as follows: Structural rivets, 4.75c.; boiler rivets, 4.85c.; machine bolts up to $\frac{3}{4}$ x 4 in., 40-10; larger sizes, 35-5; carriage bolts up to $\frac{3}{4}$ x 6 in., 40-2 $\frac{1}{2}$; larger sizes, 30-5; hot pressed nuts, square, 33, and hexagon, 33 off per 100 lb.; lag screws, 50.

Wire Products.—The situation is easing up a little, principally because of the better movement of railroad freight. We quote to jobbers as follows, per 100 lb.: Plain fence wire, Nos. 6 to 9, base, \$3.339; wire nails, \$3.389; painted barb wire, \$3.539; galvanized barb wire, \$4.239; polished staples, \$3.539; galvanized staples, \$4.239, all Chicago, carload lots.

Cast-Iron Pipe.—Despite advancing costs, requests for bids of small lots continue to come out. Grand Rapids, Mich., is to award 400 tons, Hammond, Ill.,

260 tons, and Cooperstown, S. D., 300 tons. The 150 tons for which Kalamazoo, Mich., was in the market was awarded to the Lynchburg Foundry Company. Prices are \$5 to \$7 per ton higher. We quote as follows, per net ton, Chicago: Water pipe, 4-in., \$53.50; 6-in. and larger, \$50.50, with \$1 extra for class A water pipe and gas pipe.

Old Material.—The largest local interest has entered the market for heavy melting and shoveling steel, which, coupled with a general and widespread demand, has created what is called a seething market. The activity of the large interest referred to is construed to mean that it is short of pig iron, which is confirmed by the fact that two of its furnaces have been out of blast. Aside from the demand for the melting-steel grades, cast scrap is in heavier demand also, indicating that the foundries are beginning to face the melting of high-priced pig iron. The Pennsylvania Lines West is offering a list embracing several thousand tons, but not an unusual one for this road. The Illinois Central is offering about 4500 tons. We quote for delivery at buyers' works, Chicago and vicinity, all freight and transfer charges paid, as follows:

Per Gross Ton	
Old iron rails	\$29.00 to \$30.00
Relaying rails	34.00 to 35.00
Old carwheels	22.50 to 23.00
Old steel rails, rerolling	31.00 to 32.00
Old steel rails, less than 3 ft.	28.50 to 29.00
Heavy melting steel scrap	26.00 to 26.50
Frogs, switches and guards, cut apart	25.00 to 25.50
Shoveling steel	23.50 to 25.00
Steel axle turnings	16.50 to 17.00

Per Net Ton	
Iron angles and splice bars	\$30.00 to \$30.50
Iron arch bars and transoms	31.50 to 32.00
Steel angle bars	27.00 to 27.50
Iron car axles	37.00 to 38.00
Steel car axles	38.00 to 39.00
No. 1 railroad wrought	29.50 to 30.00
No. 2 railroad wrought	27.50 to 28.00
Cut forge	27.50 to 28.00
Pipes and flues	15.50 to 16.00
No. 1 busheling	18.50 to 19.00
No. 2 busheling	13.50 to 14.00
Steel knuckles and couplers	25.50 to 26.00
Steel springs	26.50 to 27.00
No. 1 boilers, cut to sheets and rings	16.00 to 16.50
Boiler punchings	21.00 to 21.50
Locomotive tires, smooth	36.00 to 36.50
Machine-shop turnings	9.50 to 10.00
Cast borings	10.00 to 10.50
No. 1 cast scrap	19.25 to 19.75
Stove plate and light cast scrap	14.00 to 14.50
Grate bars	13.50 to 14.00
Brake shoes	13.50 to 14.00
Railroad malleable	19.50 to 20.00
Agricultural malleable	17.50 to 18.00

Philadelphia

PHILADELPHIA, Pa., April 3, 1917.

The first quarter of the year closed with a tremendous rush of specifications for all kinds of finished material. This was not surprising in view of the great activity in all lines and the numerous advances in prices which have taken place. For example, some of the steel plate tonnage which has just been specified was sold at from 3 $\frac{1}{2}$ c. to 4c., Pittsburgh, while to-day 6.50c. is the lowest price at which any independent will take orders. Although prices of Southern irons have advanced fully \$10 per ton during the quarter and Northern foundry irons about \$15, a large percentage of recent deliveries is of iron which sold at low prices, and furnace owners are pointing out that, on account of the very high cost of coke during the past few months and the unsatisfactory operating conditions of furnaces, costs have been and still are extremely high, and it is asserted that some furnaces are making little money at prices which, compared with those of normal times, are very high. The market for pig iron and finished materials continues very strong. The price tendency is upward. So far, few orders have been received from the Government, but manufacturers are holding themselves in readiness to take care of a large amount of business for the War and Navy departments.

Pig Iron.—The largest purchase of the week was 6800 tons of foundry grades and 2000 tons of charcoal pig iron by the Pennsylvania Railroad for delivery during the last half of this year at Altoona. The foundry grades consisted of 4000 tons, with silicon 2 $\frac{1}{4}$ to 3 per cent; 1500 tons, with silicon 1 to 1.75 per cent,

and 1300 tons of high manganese. It is understood that the foundry iron was purchased from a nearby furnace at about \$38, furnace, which is considerably lower than the prices prevailing in eastern Pennsylvania, where \$40, furnace, now seems to be the minimum for No. 2 X. A Lehigh Valley furnace, after selling a considerable tonnage of No. 2 X for last half at \$40, furnace, has advanced to \$41. At least one company is selling for delivery in the first half of 1918 at \$40, furnace, but sales for that period are not believed to be numerous. Two sales of 2000 tons each of gray forge for second-quarter delivery have been made at \$38. Virginia iron for delivery the first half of 1918 has been advanced to \$34, furnace, but no sales at that figure have been announced. There is not much activity in Alabama iron and furnaces seem to be pretty well sold up for this year. A sale of 600 tons of high manganese Southern iron for last-half delivery was made at \$36, furnace, a remarkably high price for an iron which usually sells at about 50c. higher than No. 2 foundry. A strong demand is reported for low phosphorus iron; standard grades are selling at \$70 to \$75, furnace, while the copper-bearing product sells at \$65 to \$70, furnace. Quotations for standard brands delivered in buyers' yards for prompt shipment range about as follows:

Eastern Pa. No. 2 X foundry.....	\$40.00 to \$41.00
Eastern Pa. No. 2 plain.....	39.50 to 40.00
Virginia No. 2 X foundry.....	38.25 to 38.75
Virginia No. 2 plain.....	38.25 to 38.75
Gray forge	36.75 to 37.75
Basic	36.00 to 37.00
Standard low phosphorus.....	70.00 to 75.00

Ferroalloys.—No foreign ferromanganese is being offered for sale and prices on domestic are firm. Although on bids submitted to the Government, ordinary quotations have been shaded, there seems to be considerable doubt as to whether the sellers could deliver at prices as low as \$210, which has been named. This, however, is substantiated by the fact that after one quotation of \$295 was made by a Philadelphia seller on 200 tons for delivery at Government plants, the Government offered to take 50 tons, but the seller declined to receive an order for less than 200. On domestic ferromanganese for either prompt or last-half delivery, the usual quotation is \$300 and some are quoting \$350 without, however, expecting to sell. The highest price reported recently was \$325 for a carload. In one case in which a New York firm quoted \$259, the price was withdrawn before the Philadelphia firm having the inquiry could send in the order. The usual quotation on spiegeleisen is \$75 for last half, although one concern is selling at \$60 for delivery the last quarter of this year.

Iron Ore and Manganese.—The recent disturbances in Cuba have seriously affected the operation of some of the high-manganese ore mines with the result that shipments are much curtailed and, although order has been restored, damage done to the mines by rioters will prevent normal shipments being made for some time. A sale of 2000 tons of Brazilian ore at 87½c. per unit for manganese and 10c. for iron has been made. All companies, however, are not willing to pay this high price. One leading consumer recently declined to buy at 75c. per unit for manganese and nothing for iron. Great difficulty is experienced in obtaining vessels in which to ship the Brazilian product. A sale amounting to about \$1,000,000 recently was made, but the seller has not yet been able to charter vessel capacity to carry the ore. Several vessels carrying Indian ore sailed three or four months ago and have not been heard from. A consignment of north African ore is expected to arrive soon in a Russian vessel.

Structural Material.—The 3.75c. Pittsburgh quotation, which last week was the lowest except that of the Carnegie Steel Company which still quotes 3.60c., Pittsburgh, for delivery at convenience of the mill, has been withdrawn and 4c. is now minimum with 4.25c. not an unusual quotation, and even at the highest price, delivery is not promised in less than three to four months by any company. The strongest demand for shapes comes from shipbuilders and carbuilders, the demand from the former being extremely active.

The Richmond, Va., terminal, 700 tons, has been awarded to the Virginia Bridge Company.

Plates.—Shipyards, railroad and locomotive shops and also boiler shops filed specifications liberally toward the close of the first quarter, which expired March 31, and all tonnages under contract have been specified. Nominally there has been no advance in quotations, but some mills whose open price is 6.50c., Pittsburgh, for tank plates frequently quote 7c., and even higher prices are sometimes named. It is reported that the Cunard Steamship Company has decided to order more than 100 passenger steamships from shipyards in the United States and that about 200,000 tons of shapes and plates will be required. Owing to the crowded conditions of the mills and shipyards, many of these vessels could not be built until far into the future. Shipyards which it is believed have been offered some of this work are trying to cover with the steel mills for their plate and shape requirements, and it is believed in some quarters that plates will be selling on a basis of 10c. before the end of the summer. The Carnegie Steel Company continues to quote 4.50c., Pittsburgh, for tank plates, and quotations by leading independent companies are 6.659c., Philadelphia, for tank plates; 8.159c. for ship plates; 9.659c. for Lloyd's boiler steel, and 16.059c. for marine boiler steel.

Billets.—The scarcity of semi-finished material is more pronounced. One company which has been a seller of billets finds that it needs all that it can produce to fill contracts and take care of its own needs, and it seems doubtful now whether any open-hearth rerolling billets could be had below \$70 while forging billets are quoted nominally at \$90 to \$100.

Bars.—There is very little activity in bars, the Carnegie quotation remaining at 3.35c., Pittsburgh, for steel bars and independents quoting 3.75c., Pittsburgh, for anything approaching prompt delivery. Bar iron is selling at 3.50c., Pittsburgh, or 3.659c., Philadelphia. The transactions are not numerous.

Sheets.—The price of No. 10 blue annealed sheets has again been advanced \$5 per ton and is now quoted at 5.75c., Pittsburgh, or 5.909c., Philadelphia. The demand is very active. Mills are sold far ahead and are not anxious to take on additional tonnage.

Coke.—Easier conditions continue to prevail in the coke market, but the deliveries are still far from satisfactory, and embargoes to points in New England are causing much trouble. Shortage of motive power is reported in the Connellsville region. It is probable that for prompt furnace coke \$8 per net ton at oven could be shaded. Foundry coke for last half is selling at \$8.50 and for prompt delivery at \$10 to \$11.

Old Material.—Sales of heavy melting steel in the Pittsburgh district at \$27 have had a stimulating effect on the Philadelphia market, and while Philadelphia prices are not quotably higher, they are strong. Railroad wrought is still active. Carwheels are advancing and scarce. A notable fact is that in the last list sent out by the Pennsylvania Railroad Company there was not a single carwheel. This is almost unprecedented. Quotations covering eastern Pennsylvania, and taking freight rates from 35c. to \$1.35 per gross ton, are as follows:

No. 1 heavy melting steel.....	\$24.50 to \$25.00
Old steel rails, rerolling	32.50 to 33.00
Low-phos. heavy melting steel scrap.....	35.00 to 36.00
Old iron and steel axles (for export).....	43.00 to 45.00
Old iron rails.....	30.00 to 31.00
Old carwheels	25.00 to 26.00
No. 1 railroad wrought.....	34.00 to 35.00
Wrought iron pipe.....	21.00 to 22.00
No. 1 forge fire.....	17.50 to 18.00
Bundled sheets	17.50 to 18.00
No. 2 busheling	13.50 to 14.50
Machine-shop turnings	15.00 to 16.00
Cast borings	15.50 to 16.50
No. 1 cast	25.00 to 26.00
Grate bars, railroad.....	17.50 to 18.00
Stove plate	18.00 to 19.00
Railroad malleable	18.50 to 19.00

The J. L. Mott Iron Works will remove its main offices from New York City to its plant at Trenton, N. J.

Cleveland

CLEVELAND, OHIO, April 3, 1917.

Iron Ore.—Navigation opened on Lake Erie April 2, and reports indicate that ice conditions in Lake Superior and the Soo have improved rapidly in the past few days. Some vessel men now expect navigation to open on Lake Superior by April 25 or earlier. Dock shipments are heavy, efforts being made to get as much ore off the docks as possible before navigation opens. We quote as follows, delivered lower Lake ports: Old range Bessemer, \$5.95; Mesaba Bessemer, \$5.70; old range non-Bessemer, \$5.20; Mesaba non-Bessemer, \$5.05.

Pig Iron.—The demand for foundry iron for the last half of this year and the first half of 1918 continues quite active, and prices are about \$1 per ton higher. Sales of foundry iron for early delivery, in lots of 100 tons and over, have been made by a northern Ohio furnace at \$40 for No. 2. A number of sales for last-half delivery have been made by Ohio furnaces at \$39, in lots of 1000 tons and under, and one interest has advanced its first-half price to \$36, at which it has taken some business. One selling agency reports sales of 20,000 tons in the past week. Additional orders for foundry and malleable iron have been placed by Michigan and Ohio automobile companies and foundries associated with them, and these are said to be well covered for their first-half requirements. On the other hand, a number of jobbing foundries in Cleveland territory have not yet purchased their last-half iron, being unwilling to do so until their trade are ready to place contracts for castings. Basic iron is not plentiful, and furnaces having any of this grade to sell are inclined to hold it for higher prices. One northern Ohio consumer is in the market for 10,000 tons of basic for the second and third quarters, and quotations as high as \$39 have been made on this inquiry. Southern iron is also firmer. Several sales for the last half are reported at \$32, Birmingham, for No. 2, but the seller is now holding for \$33. For the first half of next year, \$32 is quoted. Embargoes have been lifted and shipments of Southern iron are now coming through in large volume to northern Ohio points. We note the sale of a small lot of No. 1 Virginia iron at \$37, furnace. However, the general quotation on this iron has been advanced \$1 per ton to \$38 for No. 2, for the last half of 1917, and \$34 for the first half of next year. In Cleveland territory the market has continued quiet, and there has been little buying for next year, but a number of inquiries are now pending on lots of 1000 tons and under. We quote, delivered Cleveland, as follows:

Bessemer	\$39.95 to \$40.95
Basic	35.95
Northern No. 2 foundry	39.30 to 39.95
Southern No. 2 foundry	36.00 to 37.00
Gray forge	35.95
Ohio silvery, 8 per cent silicon	46.62
Standard low phos., Valley furnace	75.00

Coke.—The market is quiet and prices show little, if any, change from a week ago. Standard Connellsville foundry coke is quoted at \$7.50 to \$8.50 per net ton at oven for contract, and \$10.50 to \$11 for prompt shipment. The Cleveland Furnace Company has equipped its Semet-Solvay by-product plant for making foundry coke, and is now offering it for prompt shipment. We note the sale of 1000 tons of Virginia coke at \$8 for delivery during the year starting with July 1.

Finished Iron and Steel.—New demand is active in most finished lines. One mill agency reports that its March orders and specifications broke former records, and another that the month's business was very close to that of its record-breaking month last year. Considerable new inquiry is coming out for third-quarter contracts. Several new rail inquiries are pending for additional tonnage for 1918, mostly from traction lines. There is a great deal of inquiry for steel bars for any delivery that mills are able to make. Heavy specifications are coming from the shipyards for the 56 boats of Welland Canal size recently ordered for the seagoing trade. A Cleveland mill has sold forging billets at \$100, and is now quoting these at \$105 and open-hearth sheet bars at \$75 to \$80. The differences between the Cleveland contractors and employees in the building trades, which resulted in a lockout, which

has existed for the past month, and which caused a suspension of practically all the building work, have been adjusted, and it is expected that work will be resumed shortly. Little new building work is being figured on. Tank plates are quoted at 6c. to 6.50c. for early delivery, a Cleveland mill having advanced this quotation to the latter price. Hard steel bars are firm, the general quotation now being 3.25c. at mill. Bar-iron prices are unchanged at 3c. to 3.10c. The demand for sheets is very heavy, and many consumers are in the market for second and third-quarter contracts. A number of the Ohio sheet mills are now making their quotations on the Pittsburgh basis, instead of at mill, as has been their custom. Sales are being made at 5.75c., Pittsburgh, for No. 28 black; 5.25c. for No. 10 blue annealed; and 7.50c. for No. 28 galvanized, these prices fairly representing the market. Warehouse prices are unchanged at 4.35c. for steel bars, 5.60c. for plates, 4.60c. for structural material, 5.50c. for hoops, and 5.50c. for blue annealed sheets.

Bolts, Nuts and Rivets.—The demand for bolts and nuts is heavy, March specifications having exceeded those of any month since December. There is a large volume of inquiry for last-half contracts, but manufacturers will not open their books for that delivery for the next two or three weeks. An unsatisfactory situation confronts the bolt and nut makers in that they are unable to contract for fuel oil for the last half. Ordinarily, oil producers are willing to make contracts for fuel oil, but now they are willing to sell only at current prices. The demand for rivets continues active, with prices unchanged at 4.75c., Pittsburgh, for structural rivets, and 4.85c. for boiler rivets. Bolt and nut discounts are as follows:

Common carriage bolts, $\frac{3}{8}$ x 6 in., smaller or shorter, rolled thread, 40 and 10; cut thread, 40 and $2\frac{1}{2}$; larger or longer, 30 and 5. Machine bolts with h.p. nuts, $\frac{3}{8}$ x 4 in., smaller or shorter, rolled thread, 50; cut thread, 40 and 10; larger or longer, 35 and 5. Lag bolts, cone point, 50. Square and hexagon, h.p. nuts, blank, \$2.50 off the list; tapped, \$2.30 off. C.p.c. and t. hexagon nuts, all sizes, blank, \$2.25 off; tapped, \$2 off. Cold pressed semi-finished hexagon nuts, 50, 10 and 5 off.

Old Material.—The market is not active but very firm, and advances have been made on several grades. The dullness is attributed largely to the fact that there has been a disposition among dealers and consumers to await developments in the war situation. The higher prices have brought out some small lots of material. Heavy melting steel is up about \$1 per ton, sales being reported at \$26. Both steel and iron rails have advanced. Rerolling rails are scarce and in demand. Iron axles are also scarce, and there is a call for these from shipyard forge shops. Cast scrap is not plentiful, and higher. Sales are reported at \$21.50. Railroad grate bars have advanced \$1 per ton, local sales having been made at \$16. No. 2 busheling has sold at \$15.50. We quote, f.o.b. Cleveland, as follows:

Per Gross Ton	
Steel rails	\$22.00 to \$23.00
Steel rails, rerolling	34.00 to 35.00
Steel rails under 3 ft.	31.00 to 32.00
Iron rails	31.00 to 32.00
Steel car axles	45.00 to 47.00
Heavy melting steel	25.00 to 26.00
Carwheels	22.50 to 23.00
Relaying rails, 50 lb. and over	37.00 to 38.00
Agricultural malleable	16.50 to 17.00
Railroad malleable	23.50 to 24.00
Light bundled sheet scrap	15.50 to 16.00

Per Net Ton	
Iron car axles	\$46.00 to \$47.00
Cast borings	10.75 to 11.00
Iron and steel turnings and drillings	10.00 to 10.25
No. 1 busheling	19.00 to 19.50
No. 1 railroad wrought	27.00 to 27.50
No. 1 cast	21.00 to 21.50
Railroad grate bars	16.00 to 17.00
Stove plate	14.25 to 14.50

A crane of no less than 300 tons' capacity, and of 100 ft. span 100 ft. above the floor, is called for in the equipment of the gunshop for the Bureau of Yards and Docks at Washington, D. C., general bids for which are to be taken on April 9.

The American Steel Export Company, New York, has received an order for 99 boiler furnaces for use in ships being built in Japan.

Cincinnati

CINCINNATI, OHIO, April 3, 1917.—(By Wire.)

Pig Iron.—An inquiry from a large company having a branch in central Ohio calls for approximately 6000 tons of Southern foundry iron and 3000 tons of Northern iron, together with a small lot of silvery. Practically all of this is wanted for shipment this year. A number of smaller inquiries have been received from Ohio, Indiana and Michigan melters, but it seems to be the general rule now not to farm these out, but to deal with individual selling firms. The scarcity of Southern iron for prompt shipment has caused a phenomenal advance and no prices can be found here below \$34, Birmingham basis, and many producers are holding firm at \$35, for second quarter shipment. For last half shipment the price is around \$32, Birmingham. A little warrant iron could be had on the basis of \$33 for prompt shipment. Northern No. 2 foundry iron is not obtainable for second quarter shipment and is now held at \$37, Iron-ton, for last half movement, with only a limited tonnage to be obtained at this figure. While the asking price for the first half of next year is higher, it is generally understood that the furnaces are willing to take on some business at \$37 for that delivery. Among sales reported are 2000 tons of standard Bessemer to a consumer in this territory for last half shipment. A central Indiana firm bought 1000 tons of Northern foundry for shipment in the first half of 1918. Another Indiana melter took 500 tons of malleable for the same delivery. Virginia irons have been marked up to \$34, at furnace, for No. 2X for shipment in the first half of next year, but the price for last half delivery this year is \$35 to \$36. Based on freight rates of \$2.90 from Birmingham and \$1.26 from Iron-ton, we quote, f.o.b. Cincinnati, as follows:

Southern coke, No. 1 f'dry and 1 soft.	\$36.40 to \$36.90
Southern coke, No. 2 f'dry and 2 soft.	35.90 to 36.40
Southern coke, No. 3 foundry.....	35.40 to 35.90
Southern coke, No. 4 foundry.....	34.90 to 35.40
Southern gray forge	31.90 to 32.40
Oh o silvery, 8 per cent silicon.....	45.26 to 46.26
Southern Ohio coke, No. 1.....	38.76
Southern Ohio coke, No. 2.....	38.26
Southern Ohio coke, No. 3.....	37.76
Southern Ohio malleable Bessemer.....	38.26
Basic, Northern	38.26
Lake Superior charcoal	37.20
Standard Southern carwheel	33.90

(By Mail)

Coke.—Quite a number of inquiries are out for foundry coke in spite of the heavy buying about three weeks ago. Some consumers are also asking for small lots to fill in, but sales of either prompt or contract coke in all four districts are scarce. Connellsville and New River foundry for prompt shipment is quoted from \$10.50 to \$12 and on contract \$8 to \$9; Wise County and Pocahontas, being scarcer, would probably bring \$11 to \$12 per net ton at oven for spot shipment. No interest is taken in furnace coke. Nominal quotations would be \$7 to \$8 per net ton at oven for future shipment.

Finished Iron and Steel.—Mill shipments are a great deal more satisfactory. There is now little trouble in making deliveries to customers except on a few special items where the warehouses allowed their stocks to be entirely depleted. Building operations are on the mend, and as a consequence there is a heavy call for reinforcing concrete bars, small structural shapes, etc. The warehouses are also shipping to nearby towns wire nails and barb wire in larger quantities than they have for a number of weeks. Store prices, which are unchanged, are as follows: Wire nails, \$3.60 per keg, base; barb wire, 4.40c. to 4.45c.; steel bars, 4.15c.; twisted steel bars, 4.30c.; rounds and squares, 2-in. and over, 4.45c.; structural shapes, 4.40c.; plates, ¼ in. and heavier, 5.50c.; 3/16 in., 5.60c.; No. 8 gage, 5.65c.; No. 10 blue annealed sheets, 5.50c.; machine bolts, ¾ x 4 in. and smaller, 50 per cent discount; larger and longer, 30 and 10 per cent discount; hack saws, 10 per cent discount; set screws, 45 per cent discount, and files, 50 and 10 per cent discount. The nearby mills are quoting No. 28 galvanized sheets at 7.65c. and No. 28 black at 5.65c., f.o.b. Cincinnati or Newport, Ky. Blue annealed sheets are hard to get and the nominal mill and warehouse prices are practically the same, being around 5.50c.

Old Material.—While there have been advances on many grades of scrap, business is only comparatively good. However, outbound shipments at the present time are said to be in excess of inbound. Cast borings and steel turnings do not seem to be in very good demand and prices on this class of scrap are not proportionately keeping up with the market on other grades. The following are dealers' prices, f.o.b. at yards, southern Ohio and Cincinnati:

Per Gross Ton	
Bundled sheet scrap	\$15.00 to \$15.50
Old iron rails	24.75 to 25.25
Relaying rails, 5 lb. and up.....	29.00 to 29.25
Re-rolling steel rails.....	27.00 to 28.00
Heavy melting steel scrap.....	21.50 to 22.00
Steel rails for melting.....	21.50 to 22.00
Per Net Ton	
No. 1 railroad wrought.....	\$24.00 to \$25.00
Cast borings	6.50 to 7.00
Steel turnings	6.50 to 7.00
Railroad cast	17.25 to 17.75
No. 1 machinery cast.....	18.50 to 19.00
Burnt scrap	11.00 to 11.50
Iron axles	33.50 to 34.00
Locomotive tires (smooth inside)....	33.00 to 34.00
Pipes and flues	13.75 to 14.25
Malleable cast	16.00 to 16.50
Railroad tank and sheet.....	14.00 to 15.00

Birmingham

BIRMINGHAM, ALA., April 2, 1917.

Pig Iron.—No rush is seen to purchase pig iron at the new high levels by the trade at large, but there are enough of those who "must have it" to maintain and even raise prices. At the close of the month the Birmingham minimum was \$32. On the part of the leading interest this quotation was for all this year and into the first quarter of 1918, with actual sales made into 1918. Sloss-Sheffield was out of the market until April 1, and it was understood on Saturday that its books would open this week at \$35. One interest quoted \$34 on 2000 tons for May and June delivery. The Alabama Company quotes \$32 for regular foundry and \$35 for special Clifton iron for 1918 and is out of the market for the rest of the year. One producer, who has an unsold capacity for this year of only about 50,000 tons, estimates that its regular customers will need 75,000 tons. One small interest reports practically capacity booked for the rest of this year. Woodward is heavily booked on basic. One company sold lots of 300, 500 and 1800 tons for Southern delivery in the last half at \$32. Carload lots have brought \$33 to \$35. It is doubtful if shipments equaled the make in March. One company turned out 24,000 tons, shipped 23,000 tons and was booked to ship 40,000 tons; a small accumulation has been the probable result. It is understood that Sloss-Sheffield is regularly shipping the full quota of basic iron which it is making for the British Government. It will blow out a City furnace for relining. April enters with little iron to offer for the rest of 1917 and higher prices still imminent. We quote per gross ton, f.o.b. Birmingham district furnaces, as follows:

No. 1 foundry and soft.....	\$32.50 to \$33.50
No. 2 foundry and soft.....	32.00 to 33.00
No. 3 foundry.....	31.50 to 32.50
No. 4 foundry.....	31.25 to 32.25
Gray forge	31.00 to 32.00
Basic	32.00 to 33.00
Charcoal	36.50 to 37.50

Cast-Iron Pipe.—Cast pipe continues to advance with pig iron and is now up to \$48 for 4-in. and \$45 for 6-in. and upward, f.o.b. Birmingham shop yards. In each rise there come enough fill-in orders which, together with larger ones received some time ago, serve to keep shops busy. National is reported as supplied with orders several months ahead. Soil pipe makers report only a moderately good business.

Bars.—Steel bars, f.o.b. Birmingham, are quoted in carload lots at 3.50c. to 3.75c.; bar iron, 3.30c. to 3.50c.

Coke.—Coke has attained still higher prices. The two leading producers of high-grade standard beehive coke are quoting spot at \$15 per net ton at oven and contracts at as high as \$12. They report that they have practically no coke for any delivery. The Gulf States Steel Company is assembling a working force at its

37 Koppers ovens in Alabama City, which will be started this month. Furnace coke is selling at \$5 and \$6 per net ton at oven.

Old Material.—The market has become much stronger. There is a special drive on cast scrap, owing to the high price of pig iron and the more extensive use of scrap in foundries, pipe shops, etc. Trading is active, and several grades have been marked up as much as \$2. Still higher prices are looked for as scrap becomes more scarce. We quote, per gross ton, f.o.b. Birmingham district yards, as follows:

Old steel axles.....	\$35.00 to \$36.00
Old steel rails.....	19.00 to 20.00
No. 1 wrought.....	21.00 to 22.00
Heavy melting steel.....	17.50 to 18.50
No. 1 machinery.....	19.00 to 20.00
Carwheels.....	16.00 to 16.50
Tramcar wheels.....	14.50 to 15.00
Stove plate.....	13.00 to 14.00
Shop turnings.....	8.50 to 9.00

Buffalo

BUFFALO, N. Y., April 3, 1917.

Pig Iron.—Inquiry is of large volume, and buying is of good proportions, considering the sold-out condition of furnaces and the scarcity of iron obtainable. The trend of prices continues sharply upward. Producers have been quoting from \$40 to \$42 for the past few days on 1917 business. The furnaces of the district have little untaken capacity, and there appear to be only limited quantities for sale from any producing district. Malleable and basic are scarcer and range higher in price than foundry grades, and indications foreshadow a pronounced famine in all a little later on. A moderate lot of high sulphur iron brought \$40 this week. The range for first-quarter and first-half 1918 iron is now \$35 to \$37, furnace, covering lower to higher grades, being approximately \$37 for No. 1 foundry, \$36 for No. 2 X, \$35.50 for No. 2 plain, and \$35 for No. 3 and gray forge. A week ago \$35 was the average quotation for first half, and previous to that sales for 1918 had been made at \$34, but one of the furnace interests which was selling at \$34 and \$35 for the first half has withdrawn from the market for 1918 business, on account of its oversold condition, and others are now holding off on taking additional business for 1918. Charcoal iron is very scarce, and no sales are reported. For delivery over the remainder of the year we quote as follows, f.o.b. furnace, Buffalo:

High silicon irons.....	\$42.00
No. 1 foundry.....	\$41.00 to 42.00
No. 2 X foundry.....	41.00
No. 2 plain.....	40.00 to 41.00
No. 3 foundry.....	40.00
Gray forge.....	40.00
Malleable.....	41.00 to 42.00
Basic.....	40.00 to 41.00
Charcoal.....	40.00

Finished Iron and Steel.—Reports indicate that shipments in March greatly increased over February. With the opening of several ferries across Lake Erie to Canada the local transportation situation is improving. Owing to recent advances, practically no cancellations have been made on specified quotas of contract material. Prices remain strong, the principal advances being on pipe, sheets and tin plate, and in warehouse prices on plates, the latter showing an advance of \$7 per ton, now being held at 6c., delivered. Steel bars are selling at 4.40c. from warehouse, and structural shapes at 4.60c. The Buffalo Structural Steel Company has the contract for 250 tons of steel for the powerhouse at Essington, Pa., of the Westinghouse Electric & Mfg. Company.

Old Material.—Very large inquiry is reported for heavy melting steel, one being for approximately 50,000 tons for delivery during the current quarter. The present price for this commodity is \$25 to \$26; it is expected, however, that the price to be paid in connection with the closing up of business that is now in the market will go as high as \$28 to \$30, owing to the uncertain conditions that prevail and the limited amount of material available. No short sales are being made by dealers. The entire list is active, there being increasing demand noticeable for railroad malleable, cast scrap and old carwheels. All three of these classes of

material are scarce. There are no large tonnages available for immediate delivery. We quote dealers' asking prices, per gross ton, f.o.b. Buffalo, as follows:

Heavy melting steel.....	\$25.00 to \$26.00
Low phosphorus.....	33.00 to 36.00
No. 1 railroad wrought.....	29.00 to 30.00
No. 1 railroad and machinery cast.....	24.00 to 24.50
Iron axles.....	45.00
Steel axles.....	45.00
Carwheels.....	24.00 to 24.50
Railroad malleable.....	24.00 to 25.00
Machine shop turnings.....	11.50 to 12.00
Heavy axle turnings.....	18.00 to 18.50
Clean cast borings.....	13.00 to 13.50
Iron rails.....	26.00 to 26.50
Locomotive grate bars.....	16.50 to 17.00
Stove plate.....	16.50 to 17.00
Wrought pipe.....	16.00 to 16.50
No. 1 busheling scrap.....	21.50 to 22.00
No. 2 busheling scrap.....	14.00 to 14.50
Bundled sheet scrap.....	15.50 to 16.00

San Francisco

SAN FRANCISCO, CAL., March 27, 1917.

The relief which the Pacific coast trade felt at the averting of the threatened railroad strike is more than offset by the soaring prices on steel products. To further aggravate the situation there have been strike troubles which looked somewhat serious and are not yet fully settled. The strike in the shipbuilding plant of Moore & Scott in Oakland and at the Alameda plant of the Union Iron Works involved several thousand men. The increased cost of materials has caused a sudden halting of building operations and there are reports of concrete construction being substituted for structural steel. The most active demand is in the foreign trade, notably from Japan. Japan is taking all the steel she can get. Jobbers are inclined to limit the sales of such supplies as they have in quantities by reason of the uncertainty of the market and the expectation of further advances. Jobbing prices have gone up by leaps and bounds in the past two weeks.

Bars.—Coast manufacturers of reinforcing bars are gradually being compelled to advance their quotations on a par with the Eastern basis by reason of the raw material situation. The manufacturer's price this week is on a 4c. base. The jobbers have announced advances proportionate to the following: 4.75c. for sizes under 3 in., rounds and squares, and for Eastern-made bars over 3 in., 5.25c. Iron bars have gone up to 4.65c. Twisted steel bars are quoted at 4.75c. All flats are 4.75c. Rounds and squares, 3/16-in. and 1/4-in., and 1/2-in. ovals and 1/2-in. rounds, stand at 5.25c.

Structural Material.—Local structural fabricators view the increased cost of steel products with serious alarm. The competition with concrete, always keen, is now becoming impossible on certain types of buildings hitherto favorable to steel construction. Yet there are under way numerous important industrial building work and bridge construction. Dyer Brothers, San Francisco, are finishing the fabricating work for a bascule span bridge at Seattle, the steel frame for large borax factory at Searles Lake, Cal., and the fabricated work for a pineapple cannery and a sugar refinery at Honolulu. The Vulcan Iron Works has the structural contract for the new library at Stanford University at Palo Alto, Cal. The California Steel Company, Oakland, is doing the structural steel for the American National Bank building in San Francisco.

Plates.—Warehouses have little more than odds and ends in stock, and this condition extends pretty well to the jobbers. Deliveries are slow. Inquiries are more numerous than ever. The great amount of shipbuilding to be done on the coast for the Government serves to accentuate the seriousness of the ship plate situation. Tank plates are getting scarce. Manufacturers quote, for San Francisco delivery, 6.50c. per 100 lb. The jobbers quote 7c. Good use is being made of what material is available. The Union Iron Works and Moore & Scott are to get a fair share of the shipbuilding to be given American concerns by the British in their campaign to replenish their merchant marine. Several ships will be built at the Union Iron Works, and Moore & Scott have already begun work on a steamer of 9400 tons to cost \$1,000,000. The Southern Pacific is to enlarge shop No. 9 at Sacramento in order

to facilitate the building of 2500 new cars. The Union Iron Works is to construct two steel scout ships for the Government.

Sheets.—Jobbers have advanced on blue annealed. No. 10 is quoted at 7c.; No. 12, 7.05c.; No. 14, 7.10c., and No. 16, 7.20c. These numbers have been quoted at a flat common rate heretofore. Flat galvanized remains at 7.99c. on Nos. 12 and 14, and No. 28 at 8.87c. The Schaw-Batcher Company is to rebuild its Sacramento plant in steel and corrugated construction.

Wrought Pipe.—Orders are mostly for the first half of 1918. There would be much more oil drilling if pipe could be obtained. Export inquiries are persistent. Jobbers quote $\frac{3}{4}$ -in. black at 6.20c. in lots less than 15 tons, and at 5.85c. in larger lots. Galvanized $\frac{3}{4}$ -in. is quoted likewise at 8.45c. and 8c. Lap-welded steel boiler tubes, 2-in., are quoted at \$25.03 per 100 ft. J. A. Ulmer, Ulmer Machinery Company, has been awarded the contract for laying 100 miles of steel pipe in connection with the Lindsay-Strathmore irrigation district improvements.

Cast-Iron Pipe.—The advance of \$3 per ton has not helped coast business. Pipe 6-in. and larger, class B and heavier, is now quoted at \$53, and 4 in., class B and heavier, at \$56, net ton. Class A and gas pipe are \$1 higher. The above is for 12-ft. lengths.

Pig Iron.—Fresh supplies are needed in this market. Founders have resisted attractive offers from British firms to part with what stocks they have. No. 2 foundry is quoted from \$40 to \$45 per gross ton. Prices are most uncertain.

Coke.—There are only small stocks here and \$25 is paid for spot deliveries in small lots. For future delivery in the second half the quotation is \$21.50.

Ferroalloys.—No easier condition prevails. Ferromanganese is selling around \$325 and ferrosilicon at about \$300, second quarter.

Old Material.—Rolling-mill scrap is being easily disposed of at \$15 per net ton. No. 1 machinery cast brings \$21 to \$22, and miscellaneous railroad scrap fetches as high as \$17. Light wrought scrap is said to sell above \$13.

Rails.—All special work for the municipal railroad system from Van Ness Avenue to Church Street, amounting to \$9,300, has been awarded to the United States Steel Products Company in addition to the original rail contracts. It is all solid manganese construction. Girder rails cannot be promised earlier than the first quarter of 1918. The increased cost of rails has compelled the logging interests to purchase relayers, and they are buying these wherever attainable.

St. Louis

ST. LOUIS, Mo., April 2, 1917.

Pig Iron.—Efforts to contract ahead for pig iron are numerous, but they are being headed off by the spasmodic increases in price which develop before agreement can be reached between buyer and seller in these days of submission to the furnace before closing. The contracting undertaken is divided between last half of 1917 and the first half of 1918 with increasing tendency to place orders for the latter delivery. Furnaces, however, are not at all eager to accept business even at present high prices. At present \$35, Birmingham, is about the lowest that is quoted for any shipment through 1917 and \$32 the lowest for first half of 1917, at which figure sales have been made during the week to foundries. Sales reported include 600 tons of charcoal iron for the last half of 1917, 500 tons of the same class of iron for the first half of 1918, 600 tons of Southern No. 2 foundry for first half of 1918, 300 tons of the same grade for the same delivery and a considerable number of smaller sales. The local furnace is making sales on the basis of \$39, St. Louis, but is heavily sold ahead and is also somewhat handicapped in production while putting in new stoves to increase output.

Coke.—Contracts are being made by foundries for coke for delivery through to July, 1918, and the price

for best selected 72-hour coke on such contracts ranges from \$8 to \$8.50 at the oven with special brands commanding as high as \$10. Prompt shipment coke is being sold around \$12 at the oven. The local by-product plant is making some contracts on a basis of about \$11.25, St. Louis, but is so far sold ahead as to not be a factor of moment at present.

Finished Iron and Steel.—Heavy specifying of material on contracts was the chief feature of the week and little new contracting was reported. Movement out of warehouse is up to the capacity of warehouses to handle at increased prices. We quote for stock out of warehouse as follows: Soft steel bars, 4.30c.; iron bars, 4.25c.; structural material, 4.55c.; tank plates, 5.55c.; No. 10 blue annealed sheets, 5.55c.; No. 28 black sheets, cold-rolled, one pass, 6c.; No. 28 galvanized sheets, black sheet gage, 8c.

Old Material.—In scrap the demand has sharpened materially and is coming from all sources. A general advance in prices has been recorded and still higher prices are expected. Some dealers are short and are endeavoring to cover. We quote dealers' prices, f.o.b. customers' works, St. Louis industrial district, as follows:

Per Gross Ton	
Old iron rails	\$29.00 to \$29.50
Old steel rails, rerolling	30.50 to 31.00
Old steel rails, less than 3 ft.	27.50 to 28.00
Relaying rails, standard section, subject to inspection	36.00 to 38.00
Old carwheels	21.50 to 22.00
No. 1 railroad heavy melting steel scrap	26.00 to 26.50
Heavy shoveling steel	21.00 to 21.50
Ordinary shoveling steel	19.50 to 20.00
Frogs, switches and guards cut apart	26.50 to 27.00
Ordinary bundled sheet scrap	15.50 to 16.00
Heavy axle and tire turnings	14.00 to 14.50

Per Net Ton	
Iron angle bars	\$28.00 to \$28.50
Steel angle bars	23.00 to 23.50
Iron car axles	37.50 to 38.25
Steel car axles	36.00 to 36.50
Wrought arch bars and transoms	29.50 to 30.00
No. 1 railroad wrought	26.75 to 27.25
No. 2 railroad wrought	25.50 to 26.00
Railroad springs	25.50 to 26.00
Steel couplers and knuckles	27.50 to 28.00
Locomotive tires 42 in. and over, smooth inside	34.00 to 34.50
No. 1 dealers' forge	22.50 to 23.00
Cast iron borings	10.00 to 10.50
No. 1 busheling	18.00 to 18.50
No. 1 boilers, cut to sheets and rings	15.00 to 15.50
No. 1 railroad cast scrap	17.00 to 17.50
Stove plate and light cast scrap	12.00 to 12.50
Railroad malleable	17.50 to 18.00
Agricultural malleable	16.50 to 17.00
Pipes and flues	16.00 to 16.50
Heavy railroad sheet and tank scrap	15.50 to 16.00
Railroad grate bars	13.50 to 14.00
Machine-shop turnings	10.50 to 11.00

New York

NEW YORK, April 4, 1917.

Pig Iron.—The large differentials between prices for early delivery and those for next year continue. Ideas of various producers differ also as to next year's delivery. In the Buffalo district, for example, sales for the first half of 1918 have been made recently ranging from \$33 to \$36 at furnace for No. 2 X. The leading producer of Virginia iron quotes \$38, furnace, for this year's delivery and \$34 for the first half of next year. The recent buying by the General Electric Company reached a total of 12,800 tons for the various plants, most of this being for the first quarter of next year. On that delivery \$33, Buffalo, was paid in the main, though on a small amount of special iron \$36, Buffalo, was the price for first quarter and \$40 for this year. A New York State harvesting machinery company is in the market for 3000 tons. Malleable interests are inquiring for good sized lots, but the amount placed thus far has not been large. Delivery for the first half of next year is wanted on the bulk of this, but some will be bought for 1917. The reselling of iron which was intended for export but for which vessel room was not found is still a factor. In such cases from \$1 to \$2 a ton below usual furnace quotations has been accepted. The fact is, however, that relatively little iron can be had for 1917 delivery, and that is why prices advance with such ease. Inquiries for 1918 are not as numerous as was the case two or three weeks

ago, and such buying is confined to companies able to consider 1000 tons and upward. In one case foundry pig iron has been bought for delivery in the second half of 1918. The difficulty of getting iron into New England continues, the Pennsylvania and B. & O. systems having embargoed against the New Haven, which for a long time was not able to take shipments from the other lines in the quantities offered. We quote at tidewater for early delivery as follows:

No. 1 foundry.....	\$41 to \$42
No. 2 N foundry.....	40 to 41
No. 2 plain.....	39 to 40
Southern No. 1 foundry.....	39 to 40
Southern No. 2 foundry and soft.....	38 to 39

Ferroalloys.—Representatives of British producers of ferromanganese have none to offer for any delivery this year, and they expect that licenses for shipment this year will be considerably curtailed. One representative has had no licenses yet for March shipment. A shrinkage in the British supply would be a decided embarrassment and intensify the scarcity which is now becoming apparent. Domestic ferromanganese is held at \$300 to \$350 for any delivery this year, and as high as \$400, delivered, has been asked by one maker. There is not much inquiry and sales have been few. Although manganese ore imports in January were equal to the average for 1916, the opinion has been expressed that the supply will be considerably less from now on, especially so far as producers outside of the leading interest are concerned. While it is possible to buy the ore delivered at the seaboard in Brazil, it is becoming increasingly difficult to obtain bottoms in which to transfer it to this country. Looking forward to a supply for 1918, one consumer has already offered \$250, seaboard, for British ferromanganese for delivery in the first quarter. This price compares with the last British quotation of \$185, seaboard. Spiegeleisen, 20 per cent, is firm at \$75, furnace, for early delivery, and around \$65 is asked for last half. A foreign inquiry for about 2000 tons is reported. Ferrosilicon, 50 per cent, continues strong and active. On small-lot sales prices have ranged from \$250 to \$350, delivered.

Steel Plates.—About two weeks ago 1000 tons of tank plates for the last half were sold on a basis of 5c., Pittsburgh, and at the same price about 250 tons for shipment in a few months. For a like shipment some 300 tons has in the last few days been bought at 5.50c. Thus it would seem that the last quotation may be taken as the minimum at the present time on tank plates, but the market has a wide spread among different mills' quotations, as high as 6.50c. being asked for universal plates as well as on tank plates. Last week, 3000 tons of ship plates sold as high at 8c. for the first quarter of next year. It is difficult to get consideration on new business as the additional pressure which the government may exercise to secure prompt deliveries has had the effect of filling order books still farther into 1918. We quote best deliveries on universal plates at 5.669c. to 6.669c., New York; ordinary tank plates at 5.669c. to 6.669c., and ship plates at 7.169c. to 8.169c., but indefinite delivery plates at 4.669c., New York. Out of store we quote 5½c., New York.

Structural Material.—Promptness of deliveries is more a factor than price in the larger number of structural projects under consideration. In point of tonnage government and municipal work looms large and most of other movements is for industrial plant extensions, as has been the case for months. Building work of the general or speculative nature alone continues to show the deterrent effect of high cost. With the probably large requirements for government work, particularly in connection with shipbuilding and shipyard expansion, plain material for shipment this year is pretty well pre-empted. A round lot offered to one mill for delivery in two or three months at 4.10c. at mill was not accepted. Bids have gone in on 3300 tons for a machine shop at the League Island Navy Yard and bids will be taken on April 9 for a gun shop, Bureau of Yards and Docks, Washington, taking about 4500 tons. The Aberthaw Construction Company is to build concrete ways for the Fore River Shipbuilding Corporation, including crane ways requiring 3000 tons. Three more sections of subway work in Philadelphia have been

bid on, involving 13,000 tons, making six sections in all on which the steel work is pending. The Pennsylvania is in the market for 500 tons more bridge work and the Boston Elevated has received tenders on 750 tons. A cotton mill, New Bedford, Mass., taking 900 tons, is in the market. The Belmont Iron Works has been awarded 500 tons for the Camden Forge Company, Camden, N. J., and 800 tons for a repair shop for the Alan Wood Iron & Steel Company, Conshohocken. The Phoenix Bridge Company has been awarded 1100 tons for a bridge for the Pennsylvania at Manayunk and Lewis F. Shoemaker & Co., have taken 500 tons for the New York Central and 200 tons for the Pennsylvania. The Levering & Garrigues Company has been awarded 400 tons for the Stafford Hotel, Atlantic City. We quote mill shipments of shapes for shipment in three to six months at 3.919c. to 4.169c., New York. For warehouse shipments we quote 4.50c., New York.

Iron and Steel Bars.—Some contracting has been closed for the latter part of the year at a basis of 3.35c., Pittsburgh, for steel bars, but any steel which could be obtained in three months or more would apparently bring 3.50c., while anything earlier would command 3.75c. Not enough business of this kind is going to establish the prices clearly. For delivery in a few months it is claimed that a quotation of 3.50c. was obtained on 3000 tons of 1-in. rounds. Mills which have 1917 capacity unsold resist making further commitments at this time. A few feelers have been noted to the amount of 10,000 to 15,000 tons for shell steel rounds for some possible government contracts. Output of mills in March is probably 60 per cent better than in February, in which month production in a number of mills was 35 per cent below normal. We quote mill shipments of bar iron at 3.669c., and steel bars at 3.919c., New York, except for deferred delivery which are quoted at 3.519c., New York. Out of warehouse, iron bars are 4c., and steel bars 4.35c., New York.

Cast-Iron Pipe.—No important public lettings in this vicinity have recently been announced. Private buying, however, continues in excellent volume. Prices have been advanced \$3 per ton. Carload lots of 6-in., class B and heavier, are quoted at \$50.50 per net ton, tidewater, with class A and gas pipe taking the usual extra of \$1 per ton.

Old Material.—The market continues strong on rolling-mill stock, but heavy melting steel scrap is not quite so active as it has been. Brokers quote buying prices as follows to local dealers and producers, per gross ton, New York:

Heavy melting steel scrap (for shipment West).....	\$23.00 to \$23.50
Heavy melting steel scrap (for shipment to eastern Pennsylvania)....	21.75 to 22.00
Relaying rails.....	40.00 to 41.00
Re-rolling rails.....	30.00 to 31.00
Iron car axles.....	45.00 to 46.00
Steel car axles.....	45.00 to 46.00
No. 1 railroad wrought.....	31.00 to 32.00
Wrought-iron track scrap.....	25.00 to 26.00
No. 1 yard wrought, long.....	25.00 to 26.00
Light iron.....	8.00 to 9.00
Cast borings (clean).....	13.00 to 13.50
Machine shop turnings.....	12.00 to 12.50
Mixed borings and turnings.....	12.00 to 12.50
Wrought-iron pipe (not galvanized or enameled).....	19.00 to 19.50

Much higher prices are prevailing on cast scrap at outside points than can be secured in this immediate vicinity. A sale of 1000 tons of machinery cast was made at \$30, delivered, equal to \$28.25, New York. Foundries in New York City and Brooklyn are securing cast scrap from nearby dealers at the following prices:

No. 1 machinery cast.....	\$23.00 to \$24.00
No. 1 heavy cast (columns and building material).....	22.00 to 23.00
No. 2 cast (radiators, cast boilers, etc.).....	19.00 to 20.00
Stove plate.....	16.00 to 17.00
Locomotive grate bars.....	16.00 to 17.00
Old carwheels.....	23.50 to 24.00
Malleable cast (railroad).....	22.50 to 23.00

Henry L. Exstein, Joseph Joseph & Brothers Company, Woolworth Building, New York, has returned from an extended trip to Panama and the Canal Zone, having purchased while there the entire stock of scrap

which has long been held on the Isthmus. The quantity is not exactly known, but may possibly reach 50,000 tons. It will probably be shipped to foreign markets.

British Steel Market

American Steel Scarce—Tin Plates More Stable—Larger Pig-Iron Allotments

(By Cable)

LONDON, ENGLAND, April 4, 1917.

April pig-iron allotments are larger. Hematite iron for export is nominally firmer. Tin plates are hardening and have a greater stability at 27s. 3d. American semi-finished steel is hardly obtainable. Ferromanganese is firm. Toluol is quoted at 2s. 4d., and solvent naphtha at 2s. 3d. We quote as follows:

Tin plates coke 14 x 20, 112 sheets, 108 lb., f.o.b. Wales, 27s. 3d. against 27s. last week.

Ferromanganese, £37 nominal.

Ferrosilicon, 50 per cent, c.i.f. £35 upward.

Pig-Iron and Tin-Plate Situation Easier—Scarcity of Crude Steel Conspicuous—Sheet Market Idle

(By Mail)

LONDON, ENGLAND, March 13, 1917.—The market does not vary much from week to week, but the dominant factor—the enormous pressure of essential needs in connection with the war—seems accentuated. The recent terrible weather and the more difficult aspect of the labor situation have handicapped operations, but substantial progress continues to be made and, under the protective measures taken under official control, the situation is well in hand.

The new system of allocations of pig-iron deliveries to home consumers, which came into force at the opening of the year, is working smoothly. Consumers have even been granted supplementary supplies where deliveries were found insufficient and there is not much complaint. A pretty heavy volume of business has gone through in Cleveland iron lately to provide for needs over the next quarter and even further ahead, deliveries, of course, being subject to the usual monthly allocations. The clearances for abroad, chiefly for France, have made satisfactory progress in spite of the submarine menace, and there is a fair supply of tonnage available. Maximum prices for all kinds of pig iron are unchanged and are not likely to be disturbed. The position of hematite is satisfactory, with no indication of any shortage in spite of the big demand. Pending the working off of arrears for export, only few fresh licenses are being issued. The output of basic iron is being increased, furnaces which were idle in the Midlands being restarted, while others which were running on forge and foundry iron are being switched over. Midland pig-iron producers are now mostly holding out for the maximum rates.

The stringency in semi-finished material is as conspicuous as ever. The British output is fully maintained, but urgent requirements are still on the increase and the deliveries against current contracts indirectly connected with war work are not plentiful. The receipts of American material are very small because of the shipping position, while new orders are virtually impossible. The market is very bare of offers, and c.i.f. quotations are mostly nominal, ranging from about \$95 upward for 4-in. billets. Wire rods might possibly be booked at about £29 c.i.f. for near shipment subject to freight being obtainable. There is an upward tendency in all finished iron and steel, high premiums being paid where terms are unrestricted by present regulations. Export business is quite unimportant.

The tendency in tin plates is easier, makers competing a little more freely where prompt specification is wanted. There is a lull in the domestic demand and

practically nothing doing for export, since permits are difficult.

The sheet markets are idle and featureless, export business in galvanized corrugated sheets being at a standstill. The question is now being discussed by the Makers' Association of creating a central selling office through which the whole of the British output would be handled after the war.

Iron and Industrial Stocks

NEW YORK, April 4, 1917.

The stock market has maintained its strength, notwithstanding the imminence of a declaration that a state of war with Germany exists. In some stocks noteworthy advances have occurred, as, for instance, in Central Foundry, Bethlehem common, Midvale, Sloss common, Virginia Iron & Coal and United States Steel common. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allegh-Chal., com.	27 3/4 - 29 3/4	Int. Har. of N. J., com.	116 - 116 1/2
Allis-Chal., pref.	84 - 86 1/2	Int. Har. Corp., com.	78 1/2 - 79 1/2
Am. B. & F. pref.	35 - 37	La Belle Iron, com.	85 1/2 - 88
Am. Can., com.	48 1/2 - 51 1/2	Lackawanna Stl.	84 1/2 - 87 1/2
Am. Can., pref.	107 1/2 - 107 1/2	Lake Sup. Corp.	20 1/2 - 22
Am. Car & Fdry., com.	69 - 71 1/2	Lima Loco.	58 1/2 - 62
Am. Car & Fdry., pref.	116 - 116 1/2	Lukens, com.	42
Am. Loco., com.	69 1/2 - 72 1/2	Lukens, 1st pref.	101
Am. Loco., pref.	105	Midvale Steel.	59 1/2 - 62 1/2
Am. Rd., com.	285 - 296	Nat.-Acme	34 - 34 1/2
Am. Ship, com.	75 - 79	Nat. En. & Stm., com.	34 1/2 - 35 1/2
Am. Ship, pref.	92 - 95	N. Y. Air Brake	147 - 149
Am. Steel Fdries.	61 1/2 - 63	Penn-Seaboard	101
Bald, Loco., com.	59 - 63 1/2	Pitts. Steel, pref.	99 1/2 - 100 1/2
Bald, Loco., pref.	100 1/2	Pressed Stl., com.	77 1/2 - 79 1/2
Beth. Steel, com.	143 - 148 1/2	Pressed Stl., pref.	103 - 104 1/2
Beth. Steel, class B	134 - 143 1/2	Ry. Steel Spring, com.	51 1/2 - 53 1/2
Beth. Steel, pref.	120 1/2	Ry. Steel Spring, pref.	98
Cambria Steel	111	Republic, com.	82 - 85
Central Fdry., com.	23 - 31 1/2	Republic, pref.	102 1/2 - 103
Central Fdry., pref.	40 - 49 1/2	Sloss, com.	66 - 74 1/2
Charcoal Iron, pref.	6	Sloss, pref.	97 1/2 - 98
Chic. Pneu. Tool	68 1/2 - 68 1/2	Superior Steel	31 1/2 - 34 1/2
Colo. Fuel	50 1/2 - 53 1/2	Superior Steel, 1st pref.	97 1/2 - 99
Cruc. Steel, com.	67 1/2 - 72 1/2	Transue-Williams	44 - 46
Cruc. Steel, pref.	111	Un. Alloy Steel	45 - 46 1/2
Dore & Co., pref.	99	U. S. Pipe, com.	21 - 21 1/2
Driggs-Seabury	70 - 84	U. S. Pipe, pref.	58 - 61 1/2
Gen. Electric	164 1/2 - 168 1/2	U. S. Steel, com.	118 1/2 - 118 1/2
Gt. No. Ore Cert.	32 1/2 - 36	U. S. Steel, pref.	117 1/2 - 118 1/2
Gulf States Steel	119 - 126	Va. I. C. & Coke	69 - 77
Gulf States Steel, 1st pref.	106 1/2 - 107	Warwick	9 1/2
Harb.-Walk. Refrac.	108	Westing. Elec.	51 1/2 - 53 1/2

Dividends

The American Rolling Mill Company, regular quarterly, 2 per cent and extra 1 per cent on the common and 1 1/2 per cent on the preferred, payable April 15.

The American Shipbuilding Company, 1 1/2 per cent on the common payable May 2.

The Carbon Steel Company, extra 2 per cent on the common, payable May 22.

The Charcoal Iron Company of America, regular quarterly, 15 cents per share on the common, payable April 15.

The Chicago Pneumatic Tool Company, regular quarterly, 1 per cent, payable April 25.

The Crocker-Wheeler Company, regular quarterly, 2 per cent and extra 1 per cent on the common, and 1 1/2 per cent on the preferred, payable April 15.

The Joseph Dixon Crucible Company, extra 25 per cent, payable March 31.

The Howe Scale Company, regular quarterly, 1 per cent on the common and 1 1/2 per cent on the preferred, payable April 1.

The Lukens Steel Company, regular quarterly, 1 1/2 per cent on the first and second preferred, payable April 15.

The New Jersey Zinc Company, regular quarterly, 4 per cent, payable May 10, and extra 4 per cent, payable April 10.

The Transue & Williams Steel Forging Company, regular quarterly, \$1 per share, payable April 16.

The Westinghouse Air Brake Company, stock dividend, 20 per cent, payable April 21.

The Westinghouse Electric & Mfg. Company, regular quarterly, 8 1/2 cents per share, each, on the common and preferred, the common payable April 30 and the preferred April 16.

The 600-ft. boat being constructed at the Lorain yards of the American Shipbuilding Company for the Pittsburgh Steamship Company will be named Homer D. Williams, in honor of the president of the Carnegie Steel Company.

Metal Markets

The Week's Prices

Cents Per Pound for Early Delivery							
Copper, New York		Tin, New York		Lead, New York		Spelter, New York	
Lake	Electro-lytic	New	York	New	St. Louis	New	St. Louis
Mar. 28.....	35.00	35.00	55.50	9.40	9.25	10.75	10.50
29.....	34.50	34.50	54.50	9.40	9.25	10.75	10.50
30.....	34.50	34.50	54.50	9.40	9.25	10.75	10.50
31.....	34.50	34.50	.....	9.40	9.25	10.75	10.50
April 1.....	34.00	34.00	54.25	9.35	9.15	10.75	10.50
2.....	34.00	34.00	54.25	9.35	9.15	10.75	10.50
3.....	34.00	34.00	54.25	9.35	9.15	10.75	10.50

NEW YORK, April 4, 1917.

Business in metals is still dull, awaiting the outcome of international events. Copper is inactive and weaker. Tin maintains its strength. Lead is quiet and fairly steady. Spelter is still stagnant and practically unchanged. Antimony continues scarce and nominally higher.

New York

Copper.—The market is falling by its own weight, and little interest is displayed by either buyers or consumers. Under present political conditions there is no inclination to do any business. Almost daily offers are being made both of resale and first-hand metal, and as a consequence prices have gradually receded. Yesterday the quotation for both Lake and electrolytic was 34c., New York. Reports of sales of considerable metal for third quarter have not been confirmed, although the quotation has receded to about 30c. to 31c., with metal for the second quarter quoted at 33c. to 34c. The report is current that the Government will need at least 90,000,000 lb. of copper in addition to that bought in March. Exports for March are estimated at 31,250 tons, although official returns are missing for the last two weeks. The London quotation was unchanged yesterday at £151 for spot electrolytic.

Copper Averages.—The average price of either Lake or electrolytic copper for March, based on daily quotations in THE IRON AGE, was 35.85c., New York.

Tin.—The situation could hardly be duller in mid-summer than it has been for the past week. Very little business has been done, and some of this has been in off-grade metal. The spot demand late last week declined to almost nothing, and since then the market has been absolutely inactive, and evidently dominated by the influence of the political situation. Large arrivals recently have caused an easier situation in spot metal, the quotation yesterday being 54.25c., New York, for spot Straits. American deliveries for the month of March were 4804 tons, of which 1404 tons came through Pacific ports. The amount in stock and landing March 31 was 3362 tons. On April 3 there was 2226 tons reported afloat, with the arrivals at 275 tons for the month. Spot Straits was quoted yesterday in London at £214 2s. 6d., a decline of about £4 from last week.

Lead.—A moderately active market is reported for most of last week, the total sales amounting to about 5000 tons, but since then buying has halted and the present week has so far been very quiet. Last week's buying was mostly for late delivery, though some spot metal was sold at 9.62½c., New York. The quotation yesterday was 9.35c., New York, for prompt or early delivery metal, with 9c. to 9.25c. asked for second-quarter delivery. The American Smelting & Refining Company's price is still 9c., New York. Inquiry as to whether producers have made any arrangement with the Government to supply its needs has failed to uncover any information. If a deal has been made it has been kept quiet.

Spelter.—Stagnation still rules this market, although inquiry is reported as more active this week. Sales have been few and price changes insignificant. The St. Louis quotation is about 10.50c. for prompt and April shipment of prime Western, with 10.25c. asked for May and June and 10c. for July. Galvanized sheet makers are reported as showing more interest and obtaining options on spelter before taking orders.

Antimony.—The market is nominal for spot Chinese and Japanese metal at 36c., with practically none obtainable despite fairly large arrivals recently.

Aluminum.—Spot metal is unchanged at 59c. to 60c. for No. 1 virgin aluminum, 98 to 99 per cent pure. The demand is not large.

Old Metals.—The demand is not so strong as it has been. Dealers' selling prices are as follows:

	Cents per lb.
Copper, heavy and crucible.....	32.25 to 32.75
Copper, heavy and wire.....	31.50 to 32.00
Copper, light and bottoms.....	27.00 to 27.50
Brass, heavy.....	20.00 to 20.50
Brass, light.....	15.75 to 16.00
Heavy machine composition.....	26.25 to 26.75
No. 1 yellow rod brass turnings.....	20.50 to 21.00
No. 1 red brass or composition turnings.....	23.00 to 24.00
Lead, heavy.....	8.875
Lead, tea.....	8.375
Zinc.....	9.00

Chicago

APRIL 3.—The easier railroad situation is responsible to a large extent for slightly lower prices in most of the metals. Business is keeping up, and more is in sight. Copper is lower, despite the fact that spot delivery to any considerable size would be difficult to arrange. Antimony is especially scarce. We quote: Casting copper, 32c.; Lake, 35c.; electrolytic, 34.50c.; tin, car loads, 55c., and small lots, 57c.; lead, 9.25c.; spelter, 10.37½c.; sheet zinc, 21c.; oriental antimony, 37c. to 38c. On old metals, we quote buying prices for less than car load lots as follows: Copper wire, crucible shapes, 27c.; copper clips, 26c.; copper bottoms, 24c.; red brass, 24c.; yellow brass, 17.50c.; lead pipe, 8c.; zinc, 8c.; pewter, No. 1, 32c.; tinfoil, 40c.; block tin pipe, 45c.

St. Louis

APRIL 2.—Lead and spelter have been weaker, but other metals have been firm. Quotations to-day on lead in carload lots are 9.25c. to 9.37½c.; spelter, 10.50c. to 10.75c. In less than carload lots quotations are: Lead, 9.75c.; spelter, 11.75c.; tin, 59c.; Lake copper, 36c.; electrolytic copper, 35.50c. to 36c.; Asiatic antimony, 40c. In the Joplin district zinc ore weakened somewhat because of inability to get cars and the basis range for zinc blende was \$72.50 to \$85 per ton. Calamine was slightly off at \$40 to \$45. Lead ore was firm at \$115. The average prices for the week for the district were: Lead, \$112; zinc blende, \$80, and calamine, \$42. On miscellaneous scrap metals we quote dealers' buying prices as follows: Zinc, 7c.; lead, 5.50c.; tea lead, 3.50c.; pewter, 25c.; tinfoil, 35c.; light brass, 12.50c.; heavy yellow brass, 13.50c.; heavy red brass and light copper, 19.50c.; heavy copper and copper wire, 23c.

Acieral, an Aluminum Alloy

An alloy containing 92 to 97 per cent aluminum and offered as a metal of strength and lightness and non-corrosive, suitable for use in the construction of automobiles, aircraft, military equipment, railroad cars, valves, hardware, etc., has been put on the market by the Acieral Company of America, 26 Cortlandt Street, New York. It is given the name Acieral and is the discovery of M. de Montby, a Frenchman. It is being supplied, it is said, to the French Government for the manufacture of helmets. It is silver white, has a specific gravity of 2.82 and a melting point of 1382 deg. Fahr. Its tensile strength in castings is given as 30,000 lb. per square inch, and in rods and sheets as 28,000 to 64,000 lb., and heat treated as upward of 70,000 lb. per square inch. It is claimed that it may be sand cast, die cast with or without pressure, hot and cold forged, annealed, drawn, rolled, stamped, hardened by temper, polished, electroplated and soldered. It withstands the action of all acids except hydrochloric.

With aluminum at 60c. per pound, Acieral in ingot form will sell, it is stated, at \$1 per pound; for marketing it is furnished in the form of ingots, castings, plates, rods, wires and tubes. It is manufactured in electric furnaces and the plant, located at 20 Orange Street, Newark, N. J., has a daily capacity of 10 tons and has been in operation for about a month and a half.

PERSONAL

At a meeting of the board of directors of the La Belle Iron Works, Steubenville, Ohio, held last week, officers were re-elected as follows: R. C. Kirk, president; H. D. Westfall, vice-president and general manager of sales; D. A. Burt, treasurer and auditor; W. B. Higgins, secretary; R. M. Rice, purchasing agent, and G. B. Le Van, general manager.

Prof. Jeremiah W. Jenks will be one of the banquet speakers at the convention of the National Metal Trades Association in New York, April 25 and 26.

Carleton A. Chase, president Syracuse Chilled Plow Company, Syracuse, N. Y., was elected president of the Associated Manufacturers and Merchants of New York State at its second annual convention at Onondaga, March 30. He succeeds Edward J. Barcalo, Buffalo.

Maurice Joseph, vice-president and general manager Joseph Joseph & Brothers Company, Cincinnati, has returned from a six weeks' vacation tour of the Pacific coast.

B. B. Quillen, vice-president and general manager Cincinnati Planer Company, Cincinnati, has returned from a month's vacation in Florida.

W. H. Thauvette, who has been superintendent of the Kelly Reamer Company, has taken a like position with F. W. Straehle & Co., builders of special machinery and manufacturers of tools, Cleveland.

Charles Holzworth, superintendent of Ella furnace at West Middlesex, Pa., has been appointed general superintendent of Ella and Claire furnaces, both at West Middlesex, owned by E. W. Mudge & Co., Frick Building, Pittsburgh. William Hollibaugh has been appointed superintendent of Ella furnace.

Harry E. Dennie, formerly located at Salt Lake City for the Imperial Belting Company, whose factory and general offices are in Chicago, has been promoted to Western manager for his company and is located at 525 Market Street, San Francisco.

Frank L. Hess has resigned as assistant production manager, National Brake & Electric Company, to take the position of general manager of the Mulkern Garage Company, Milwaukee, recently incorporated with a capital stock of \$150,000 to operate three large garages and automobile repair shops.

George A. Kissel, president Kissel Motor Car Company, Hartford, Wis., has donated a complete ambulance unit to the Wisconsin Society of the American Red Cross for the purposes of the Wisconsin Ambulance Corps. His gift has been duplicated by James Day, a retired capitalist of Hartford.

F. W. Solarek, who represented the Elyria Iron & Steel Company in Ohio and western New York, is now representing that company in Michigan, with headquarters at 1934 Dime Bank Building, Detroit.

D. M. Railsback, assistant to J. M. Hansen, president Pittsburgh Model Engine Company, Pittsburgh, Pa., has also assumed the duties of manager of works.

C. S. McKinley, for some years in the sales department in the Philadelphia office of the Republic Iron & Steel Company, has been appointed successor to W. W. Hall, formerly sales manager of the Pittsburgh office, in the Oliver Building. Mr. Hall resigned some time ago, effective April 1, to become general manager of sales of the Columbia Steel Shafting Company, Carnegie, Pa.

Edward Salts has resigned his connection with the foundry of the Jeffrey Mfg. Company, Columbus, Ohio, to become superintendent of the plant of the Lewis Foundry & Machine Company, Pittsburgh, works at Groveton, Pa.

The Hydraulic Pressed Steel Company, Cleveland, has made the following changes in its officers: A. W. Ellenberger, who was president, becomes chairman of the board, and is succeeded as president by J. H. Foster,

who was vice-president and general manager. H. P. McIntosh, Jr., who was treasurer, becomes vice-president, and R. D. Mock, who was assistant treasurer and assistant secretary, becomes treasurer and retains his position as assistant secretary. Ben Bole continues as secretary. H. B. Bole, who was factory manager, becomes general manager.

W. F. Schaphorst, advertising engineer and author of technical articles, has established an engineering advertising service office in the Woolworth Building, New York City.

James A. Campbell, president Youngstown Sheet & Tube Company, Youngstown, Ohio, has returned from a vacation spent at Hot Springs, Ark.

Paul M. Lincoln, commercial engineer of the Westinghouse Electric & Mfg. Company, has been appointed by President Wilson captain of the Engineer Corps, U. S. A. Captain Lincoln has for 24 years been associated with the Westinghouse Company and is a past president of the American Institute of Electrical Engineers.

W. P. Snyder, president Shenango Furnace Company, Pittsburgh, has returned from a long stay at Palm Beach, Florida.

James F. Pullan, master mechanic of the Taft-Pierce Mfg. Company, Woonsocket, R. I., has secured an interest in the Dover-McDevitt Company, Providence, R. I., manufacturer of tools and machinery, and will become superintendent of the latter's plant.

Rukard Hurd, director of the Department of Mines, Minnesota Tax Commission, St. Paul, Minn., has been appointed a major of the Engineer Reserve Corps, U. S. A., by President Wilson and will take an active part in the instruction camp at Fort Snelling next summer. He is now enjoying a short vacation in New Orleans.

L. S. Shaw is now handling the interests of the Terry Steam Turbine Company in Detroit, and Victor L. Sanderson is now connected with the Philadelphia office of the company.

J. E. Henry, who has been identified with the Medart Patent Pulley Company, St. Louis, for many years, has been elected secretary.

British Malleable Foundries May Adopt American Practice

Malleable iron producers in Great Britain are seriously considering the adoption of the American practice of annealing their castings. The cause is the action of the Minister of Munitions in prohibiting the use of hematite iron ore for packing the boxes in which the iron castings are annealed. British practice is so wedded to that medium that no little inconvenience has been caused and must continue to exist unless the prejudices against the American methods are dropped, says the London *Ironmonger*. In the United States iron scale is chiefly used in the annealing process and the castings are low in sulphur. The British practice has been to use largely red hematite ore and the castings average high in sulphur. Now that the supply of hematite ore has been stopped, British makers are compelled to closely scrutinize American methods.

President Alva C. Dinkey of the Midvale Steel Company, in making application for a charter for the Midvale Realty Company, has disclosed plans to develop a large tract of the company's property at Coatesville, Pa. The company owns 150 acres and will establish a large community center through the building of houses and a hotel. The houses will be of many sizes and kinds, suited to the needs of the employees.

Edward Le Bas & Co., exporters, 82-92 Beaver Street, New York, desire to caution firms having business relations with them against an impostor who is soliciting loans, claiming that he is a personal friend of Mr. Le Bas.

OBITUARY

WILLIAM HARDWICK, of Erie, Pa., died March 27, aged 69 years. Born in England, he became an apprentice in the plant now operated by the Erie City Iron Works. His promotion was rapid and when a young man he became general superintendent of the Bay State Iron Works. In 1879 he began his career as a manufacturer as a partner in the Hardwick & Cleveland Company, manufacturer of engines and boilers. In 1893 this company was incorporated as the Erie Engine Works, with Mr. Hardwick as president and general manager. In 1893 he was made president of the Union Iron Works, which had been organized a year or two previously to manufacture boilers for the Erie Engine Works and the Skinner Engine Company. In 1904 the Erie Mfg. & Supply Company was organized, with Mr. Hardwick as president and general manager. He was very active in municipal affairs and held various city offices, including one three-year term as mayor. He also served as president of the Erie Board of Trade and did much to secure the advancement of many of the city's important industrial enterprises. He was a member of the American Society of Mechanical Engineers.

Dr. DAVID H. BROWNE, metallurgist, died March 30 at his home, Montclair, N. J., aged 52 years. He was born in Ireland and at the age of 16 came to the United States, graduating with the class of 1885 from the University of Michigan. After serving as a chemist with steel and mining companies and in the University of Michigan as instructor, in 1891 he joined the newly organized Canadian Copper Company. In the service of this company he brought about great improvements in the refinement of metals and added much to the knowledge of metallurgy in this country and in the world. One of his accomplishments was the introduction of coal dust firing in reverberatory copper smelting. Dr. Browne was consulting metallurgist for the International Nickel Company and was a member of many engineering societies. He leaves his widow and three sons.

JOHN S. HYDE, since 1905 president and sole owner of the Bath Iron Works, Bath, Me., died suddenly March 19 at St. Augustine, Fla., where he was spending the winter. He was a native of Bath, the son of Thomas W. Hyde, who established the Bath Iron Works. He was graduated from Massachusetts Institute of Technology in 1888, and studied marine architecture in Glasgow University. He had served in both branches of the Maine Legislature, and two terms as mayor of his home city. He was a member of the American Society of Mechanical Engineers, American Society of Naval Architects and Marine Engineers, American Society of Naval Engineers, and of many other organizations.

CHARLES M. ENWRIGHT, Miller-Enwright Company, Sacramento, Cal., died Jan. 19, from blood poisoning, aged 30 years. He was a native of Sacramento, educated in the public schools, became a noted athlete, and not only rose to prominence in local business circles, but took a deep interest in public affairs and as a member of the City Civil Service Commission was instrumental in introducing numerous reforms. He was sales manager of his company. He leaves his widow.

CHARLES H. RICH, chief chemist and metallurgist of the Alan Wood Iron & Steel Company, died at his home in Norristown, Pa., March 24, aged 46 years. Before becoming connected with the Alan Wood Company in 1912, he was for a number of years assistant chief chemist at the Duquesne plant of the Carnegie Steel Company and later chief chemist at the Clairton plant of the same company.

FREDERICK W. DIBBLE, general manager Union Horse Nail Company, Chicago, died March 26 at Kenosha, Wis., where he had gone for his health. He

suffered a nervous breakdown recently. Mr. Dibble, who was 48 years old, had been with the Union Horse Nail Company for 30 years. He had charge of sales as well as of general management, and much of the success of the company is credited to him. He leaves a widow and two sons.

JAMES ARTHUR DISTIN, assistant general manager Halcomb Steel Company, Syracuse, N. Y., died March 31 as the result of an automobile accident, aged 36 years. After graduating from Syracuse University, in the class of 1905, he entered the laboratory of the Sanderson Works. Later he was transferred to the order department. In 1908 he went to the Halcomb Steel Company in the sales department and earned rapid advancement to the position he held at the time of his death. He was very widely and favorably known in the tool-steel trade. He leaves his widow and a son.

CHARLES A. GREGORY, president J. H. Gautier Company, manufacturer of crucibles, Jersey City, N. J., died April 1 at his home in New York City, aged 79 years. He was born in Jersey City and founded the company of which he was president more than 50 years ago. His father was Jersey City's first mayor. He had a physical breakdown three months ago and had to give up active business. He leaves three daughters.

CHARLES W. KERSTETER, general manager, Allis Fire Extinguisher Company, Milwaukee, and an inventor of note, died March 23, aged 57 years.

H. J. GROVER, sales manager of the small-tool department of the Brown & Sharpe Mfg. Company, Providence, R. I., died March 29.

To Buy Equipment for Russian Machinery Builder

A corporation has been organized at Petrograd, Russia, to build metal-working and wood-working machinery and small tools, and it is announced that a representative of this company is shortly to leave for the United States with full power to close orders for machinery for the equipment for existing factories and for factories yet to be erected. A temporary office of one of the organizers, the M. Mett Engineering Company, Petrograd, has been established at the Hotel Vanderbilt, New York City, with J. M. Wimpie representative in charge. It is emphasized that the machinery to be built will not conflict with the lines now handled by the Mett Company.

The new company has acquired the plants of Fillipov Brothers, Dangayer & Kayser, near Moscow, at a cost of \$7,500,000, and it is stated is about to acquire a chain of factories in the principal manufacturing sections of Russia. Among the organizers are the M. Mett Engineering Company, Petrograd, Russia; the Russo-Asiatic and Siberian banks, and A. E. Putilov and A. A. Bogdanov. The officers are A. E. Putilov, president; M. A. Mett, managing director, and L. S. Neuschul, financial director. Mr. Neuschul has spent a considerable time in the last two years in the United States, and will continue, it is stated, to devote his attention to the specialization of the Mett Company on the sale of American machine tools.

The Philadelphia Steel & Forge Company, Tacony, Philadelphia, has changed its name to the Tacony Steel Company. This change was made by the board of directors and stockholders as the new name, it was considered, better characterized the scope of the company's business, as well as designating its locality more definitely. No changes have been made in the officers or board of directors.

The Rowe Calk Company, Hartford, Conn., states that the item is untrue which appeared in THE IRON AGE of March 29 announcing that the company had secured a large contract from the United States Government for automobile chains.

Machinery Markets and News of the Works

PREPARED FOR WAR

Industries Ready for Nation's Needs

Many Small Orders Booked Pending Change to a War Footing—March a Strong Month—Prices Advance About 10 Per Cent

The week before war has been characterized in the machine-tool trade by uniform strength both in domestic and export business. March has been as a whole a top-notch month, for many better than February and as good as January, for some the best month in a year. While the Government has been adding extensively to its arsenal and navy-yard buildings, it has not been openly in the market for large lots of machinery. Officials at Washington and the civilian commissions assisting them are known, nevertheless, to have been extremely busy in arranging to put industry on a war footing. They have at their disposal the entire metal-working industry trained by over two years' work for the task the country will put upon it. The withdrawal of the Southwark list of about 1000 tools from the market is taken as an indication that munition plants will soon be working once more at top speed either for this nation or the Allies.

Now that war is to be declared, it is practically assured that tool builders will be called upon to meet a high pressure of demand from munition works, shipyards, aeroplane factories, automobile and truck makers in particular, and the entire metal-working industry as well. The cargo space available for transatlantic shipment will doubtless be the real measure of war business. This is already stopping the export of machine tools to a considerable extent, England permitting shipment only for absolute necessity.

An advance of 10 per cent in tool prices has been made quite generally to meet increased costs, particularly of castings, which were raised about 1c. per lb. effective April 1. The new schedules apply to nearly all deliveries over a month forward. Engine lathes, however, are quoted at former prices, as competition on them is keen.

The congestion of traffic has been relieved to some extent at the large centers in the Middle West, but on the Pacific coast and nearby conditions are worse, and most small-lot orders are being brought in by express.

New York

NEW YORK, N. Y., April 4, 1917.

The list of about 1000 tools which was recently issued by the Southwark Foundry & Machine Company branch of the Baldwin Locomotive Works for sale and which was considered to be for the time being an important factor in the market, has been withdrawn. This action is taken to indicate that the Government has awakened to the danger of scattering such valuable munition shops and that the use of these plants for war purposes may shortly be expected. No heavy purchasing is being done by the Bureau of Supplies and Accounts, aside from a short list for Puget Sound. It is known, however, that in a number of cases officials have visited plants where machinery is under construction and have taken steps to appropriate to the Government's use

equipment in process of construction. These plants are, therefore, now put under extra pressure to meet these unexpected demands. While Washington is not doing much buying there are many indications that government activity is increasing in the way of hoisting and conveying machinery. The arsenals, whose business it is to purchase for army needs, bought quite some equipment about a month ago, but are not purchasing much at the present time. It is reported that one arsenal has sent out tentative inquiries as to the ability of certain machine-tool builders to meet quickly possible requirements aggregating about \$200,000 worth of tools.

A general strengthening of demand from scattered sources has taken place. It is particularly strong for milling, radial drilling and planing machines, and the fact that deliveries on these classes of equipment are all around the first of next year only seems to intensify the efforts of buyers to get them. Inquiry for forging machinery is greater, although increasing prices and slow deliveries are causing purchasers to hold off somewhat on closing for such needs. As is only natural at such a time, the market shows some cross currents. Business with different houses varies considerably, some reporting that they have done in the past month the best business for that period within a year, while others indicate that the present crisis has caused a holding off through their trade of appreciable proportions.

Export business shows no change of consequence the past week. In general it is rather quiet, although sizable inquiry is coming from Russia for forging machinery. The Mett Engineering Company, Petrograd, which has just been established to manufacture metal and wood-working machinery and tools, has established temporary headquarters at the Hotel Vanderbilt, New York, for the purchase of machinery for a chain of factories which it will control in the principal centers of Russia. A list of about 25 tools for a steel car-building shop for France has been issued by Mr. Nogues, 15 West Twelfth Street, New York. It is understood that these have not yet been placed.

Price advances have not only taken place of late with forging machinery, but as well with manufacturers of other lines from time to time. A prominent manufacturer of radial drilling machines advanced prices last week 10 per cent. Quotations on certain classes of hoisting equipment have just been raised 10 to 15 per cent. It will be seen that these increases are small, when it is considered that boilers which enter into some types of this machinery have increased in cost in the past year 300 per cent.

Railroad buying still lags. It is reported, however, that the Atlantic Coast Line, whose purchasing department is located at Wilmington, N. C., will soon be before the market with a list of about 25 shop tools. It has just bought two large-sized turret lathes.

The Ford Instrument Company, 80 Lafayette Street, New York, is in the market for two No. 4 Stark bench lathes, one 18-in. feed milling machine and one No. 2 Brown & Sharpe grinding machine.

The J. S. Mundy Hoisting Engine Company, 696 Freylinghuysen Avenue, Newark, N. J., is in the market for a 60-in. planing machine.

The General Electric Company, Schenectady, N. Y., is buying in small lots steadily. It recently purchased two heavy shears for its Lynn shop and one for its home plant. The Bethlehem Steel Company also recently purchased a 5-in. shear.

The Taylor-Wharton Iron & Steel Company, High Bridge, N. J., is in the market for one second-hand air compressor, either steam or motor-driven, of about 500 cu. ft. per min. capacity.

The Wetter Numbering Machine Company, 255 Clason Avenue, Brooklyn, N. Y., will purchase a 2-in., 4-spindle Pratt & Whitney spline milling machine.

Kraeuter & Co., 563 Eighteenth Avenue, Newark, N. J., is in the market for a positive blower of 5000 cu. ft. capacity at one lb. pressure, General Electric centrifugal, Root or Connersville types preferred.

The Meurer Steel Barrel Company, 567 Flushing Avenue, Brooklyn, N. Y., has increased its capital stock from \$350,000 to \$650,000 to provide funds for its increased capacity. The company recently put up two new buildings at its plant at Long Island City. Jacob Meurer is president.

The Newark Gear Cutting Machine Company, 71 Prospect Street, Newark, N. J., manufacturer of gear-cutting machin-

ery, will build a one-story addition to its machine shop to cost about \$4,000.

Barnett, Inc., Newark, N. J., has been incorporated with a capital of \$100,000 to manufacture jewelry specialties. J. G. Barnett, H. Z. Steiner and M. H. Checkley, 31 Clinton Street, Newark, are the incorporators.

The Pittsburgh Plate Glass Company, Pittsburgh, Pa., is reported planning the erection of a new plant near Sherman Avenue, Newark, N. J., to cost \$100,000. Application has been made to the local board of works to grant permission to the Lehigh Valley Railroad to extend its line to accommodate the proposed works.

The Branch Brook Welding Company, Newark, N. J., has been organized to operate a local welding and general repair plant. Emil Rux, 12 High Street, is president.

The Newark Wire Cloth Company, Inc., 224 Verona Avenue, Newark, N. J., has purchased property at 848-54 Mt. Prospect Avenue, for a new four-story plant, 100 x 125 ft., estimated to cost \$50,000. John C. Campbell is president.

The General Electric Company, Schenectady, N. Y., has acquired a four-story and basement building at 349-53 Central Avenue, Newark, N. J., for lamp manufacturing, to be occupied by its Edison Lamp Works. The company is also building an addition to its plant at Boyd and Lillie streets, in the Waverly section, to provide about 80,000 sq. ft. of floor space. An addition, comprising about 100,000 sq. ft. of floor area, is being erected to the Harrison plant on Sussex Street.

August Stedenfeld, 210 Camden Street, Newark, N. J., has organized a company to operate a local plant for the manufacture of automobile and wagon bodies. William Stedenfeld also is promoting it.

F. H. Lovell & Co., Arlington, N. J., manufacturer of brass goods, has awarded contract for a one-story addition to its machine shop on Forest Avenue, with improvements in the present building, to cost \$7,000.

The Montclair Garage & Machine Shop, Montclair, N. J., has been organized to operate at 654-56 Bloomfield Avenue. Herman Albers, 888 Franklin Avenue, Brooklyn, N. Y., is president.

The Keuffel & Esser Company, 300 Adams Street, Hoboken, N. J., manufacturer of surveying, nautical and engineering instruments, has filed plans for a five-story brick addition at 312-16 Grand Street, to cost \$25,000.

The R. G. Packard Company, foot of Twenty-eighth Street, Bayonne, N. J., manufacturer of dredging machinery, has acquired riparian rights for property on the Raritan River at South Amboy, and is reported to be planning the erection of a shipbuilding plant.

The Lafayette Metal & Machinery Company, Jersey City, N. J., has been organized to operate at 456 Pacific Avenue. H. F. Barning, 249 Halladay Street, is president.

The Manhattan Rubber Mfg. Company, Willett Street, Passaic, N. J., manufacturer of mechanical rubber goods, has filed plans for an addition to cost \$140,000.

The Common Council, Salem, N. J., is planning the installation of new motor-driven pumping machinery at its Quinton water station.

The Curtiss Aeroplane & Motor Corporation, Buffalo, N. Y., is reported to be planning the erection of a plant at Atlantic City, N. J., to handle work both for the Government and commercial service.

The Interborough Rapid Transit Company, 165 Broadway, New York, will build a two and four-story brick boiler plant, 57 x 102 ft., including signal tower, at its 239th Street yards, Baychester and Bissell avenues, to cost \$74,000.

The Aluminum Goods Mfg. Company, Manitowoc, Wis., has awarded the general contract to Walter Oeflein, North Milwaukee, Wis., for the erection of a new plant at Newark, N. J., costing about \$350,000 complete. The building will be of brick, steel and concrete, six stories and basement, 75 x 374 ft., and will employ 400 men. It will replace the present factory, occupying leased quarters. The company operates a main plant in Manitowoc, and another at Two Rivers, Wis. Additions costing \$350,000 or more at Manitowoc are now being completed. George J. Vits is president.

The G. W. Bradley Ax & Tool Mfg. Company, Newburgh, N. Y., lost its plant by fire recently with an estimated loss of \$30,000. Its new plant now under construction at Jersey City, N. J., is nearly completed, and the company will resume operations there in about three weeks. This plant is about four times the size of that at Newburgh. M. T. Christopher is manager.

The Lubricating Metal Company, 2 Rector Street, New York, has increased its capital stock from \$100,000 to \$500,000 and has in addition issued \$100,000 of 7 per cent gold debenture convertible bonds. These issues are to provide working capital to handle its greatly increased business and

to pay for its new factory at Jersey City, N. J., with its additional equipment for the manufacture of bearing metal. The proceeds of the issues are also to be used in the purchase of equipment for making die cast bearings for which the company has large orders and for its expansion into a new field, the manufacture of Noheet anti acid pumps, valves and parts. The management remains as before.

The Allegetti Mfg. Company, manufacturer of razor strops, Geneva, N. Y., purchased March 29 an additional plot, 50 x 150 ft., and will erect a brick factory of 11,000 to 12,000 sq. ft. of floor space to be completed June 15.

The New York Central & Hudson River Railroad Company has let contract for erection of an engine-house and machine-shop addition at North White Plains, N. Y.

The Buffalo, Rochester & Pittsburgh Railroad Company has completed plans for a machine shop and addition to its roundhouse to be erected at Salamanca, N. Y.

The Empire Powder Corporation has commenced construction of a manufacturing plant at LeRoy, N. Y. G. P. Jones is president.

The Rome Mfg. Company, manufacturer of brass goods, Rome, N. Y., is having plans prepared for a factory building, 50 x 310 ft., two stories, and an office building, 60 x 110 ft., one story. E. L. Spriggs is superintendent.

Plans are being prepared by the Pullman Company, 79 East Adams Street, Chicago, for the remodeling of its shops at Buffalo and the erection of additional buildings and the equipping of them for the manufacture and repair of steel sleeping cars. The estimated cost is \$1,000,000.

The Rathbone-Sard Electric Company, Albany, will erect a factory for the manufacture of electric stoves and fixtures.

Philadelphia

PHILADELPHIA, PA., April 2, 1917.

The Hale & Kilburn Company, 1600 Lehigh Avenue, Philadelphia, manufacturer of railway car seats, etc., has awarded a contract for the erection of an eight-story brick plant, 120 x 236 ft., at Sixth and Filbert streets, to cost \$500,000. Cramp & Co., Denckla Building, Philadelphia, are the contractors.

Herbert J. Graham, Frederick W. Unger and C. Yarnall Abbott, Philadelphia, have incorporated with Delaware charter the H. J. Graham Engineering Corporation, with capital of \$35,000, to manufacture automobile engines and kindred specialties.

Charles Lennig & Co., Inc., 112 South Front Street, Philadelphia, manufacturer of nitric and mixed acids, will build a new one and two-story plant, 40 x 70 ft., and 20 x 20 ft., respectively, at Bridesburg. Plans now being prepared.

The Asbestos Products Company, Philadelphia, has been incorporated with a capital of \$24,000 to manufacture asbestos goods. H. R. W. Smith, Norristown, is the principal incorporator.

The Gill Glass Company, Philadelphia, is taking bids for the erection of a new plant at Tioga and Amber streets, fronting on the Pennsylvania Railroad, to comprise five buildings. The main structure will be of reinforced concrete and brick, one and three stories, 175 x 330 ft.

Samuel Nelson and Leo Belmont, Philadelphia, have incorporated in Delaware the Automatic Machine Company, with capital of \$50,000, to manufacture automatic machinery.

The Inter-Seal Corporation, 131 Liberty Street, New York, manufacturer of a patented porcelain specialty to prevent bottle refilling, will immediately install machinery in quarters recently acquired at Sheridan and North Clinton streets, Trenton, N. J., for a branch plant.

The Crescent Insulated Wire & Cable Company, 240 West Fifty-fifth Street, New York, is planning to enlarge its plant on Taylor Street, Trenton, N. J., to provide increased capacity. The capital of the company was recently raised from \$250,000 to \$1,000,000.

The Westinghouse Lamp Company, New York, has awarded a contract for a power house, 50 x 100 ft., at its new plant now in course of erection on Pennington Avenue, Trenton, N. J.

The City Garage, Trenton, N. J., is planning to occupy a new garage and repair shop at 19 South Montgomery Street. The service department will be equipped for all classes of repair work. J. B. Wikoff is general manager.

The Keystone Die & Tool Company, Camden, N. J., has been incorporated with a capital of \$50,000 to manufacture tools, dies and kindred products. David Rosen, Clayton Coffman and A. Rosenkranz are the incorporators.

The Philadelphia & Reading Railroad is taking bids for the erection of a new engine and power house addition to its

repair shops at Rutherford, Pa. Samuel T. Wagner, Reading Terminal, Philadelphia, is the engineer.

The Newton Martin Machine Works, New Holland, Pa., has commenced the erection of an addition to its plant.

The International Motor Car Company, Allentown, Pa., has awarded a contract for the erection of a one-story addition, 50 x 240 ft., to be used as an assembling plant. The construction of two extensions, 50 x 54 ft., and 50 x 70 ft., has been completed, the first to be used for machine work.

The Harrisburg Welding & Brazing Company, 80 South Eleventh Street, Harrisburg, Pa., is building an addition to its plant for new work shops.

The Cashman Tool Company, Waynesboro, Pa., recently organized, has been incorporated with a capital of \$100,000. It has acquired a local plant to be used for the manufacture of reamers and kindred specialties. C. G. and J. C. Cashman and N. K. Lightner are the incorporators.

The Weatherly Foundry & Machine Company, Weatherly, Pa., specializing in iron and steel castings, will enlarge its plant.

The Business Men's Association, Pottsville, Pa., is reported to be negotiating with the Morgan Mfg. Company, Newport, R. I., manufacturer of automobile supplies and hardware specialties, for the establishment of a local plant to provide a manufacturing space of about 20,000 sq. ft., and give employment to 100 workmen.

The plant and business of the Bellwood Mfg. Company, Bellwood, Pa., manufacturer of iron and steel castings, have been acquired at a receiver's sale by George C. Bland of Bellwood. A new company will be organized and the capacity of the plant greatly increased. It is also planned to equip the foundry for electric operation.

The Lehigh Brick Company, Allentown, Pa., recently organized with a capital of \$250,000, has awarded contract for the erection of a plant in Salisbury Township. It will have an initial capacity of 50,000 brick per day.

The Jacobson Machinery Mfg. Company, Warren, Pa., manufacturer of automobile parts and gasoline engines, is planning the erection of additions to its machine and assembling shops. It is reported to have received a large contract for rear axles and transmission equipment from the Saxon Motor Car Company, Detroit, necessitating immediate expansion.

The General Chemical Company, 25 Broad Street, New York, is making rapid progress in the erection of its new plant at Marcus Hook, Pa. The buildings for the most part are three and four-story structures, averaging from 100 x 200 to 600 ft. in size. It is said that four or five of the new buildings will be used by the Baker Adamson Company, a subsidiary.

D. J. Driscoll, Reading, Pa., has bought the abandoned plant of the Multiple Parts Company at Hamburg, Pa. It will be enlarged for the manufacture of steel billets for his seamless tube plant.

Baltimore

BALTIMORE, Md., April 2, 1917.

The Randall Metal Mfg. Company, 39 South Charles Street, Baltimore, has been incorporated with \$10,000 capital. The incorporators are William D. Randall, Walter R. Lyon and Aubrey Pearre, Jr.

The firm of Crook, Kries & Co., machinists and contractors, 28 Light Street, Baltimore, has been dissolved. The H. E. Crook Company, of the same address, has been incorporated with \$120,000 capital stock by Howard E. and Clarence H. Crook, Robert A. Bushman, William L. Handy, Harry H. Madden and Lawrence F. Magness, to do machine and general contracting work. Henry A. Kries will engage in the same business at 207 Union Trust Building.

The Maryland Metal Tie Company, 627 Munsey Building, Baltimore, contemplates the erection of a plant at Havre de Grace, Md. Considerable machinery will be installed.

The Warner Engine Company, Richmond, Va., has been incorporated with \$50,000 capital stock. Jesse J. Warner, Petersburg, Va., is president.

The Dan Metal Company, Salisbury, N. C., has been incorporated with \$100,000 capital stock by J. P. Sanders, W. E. Hackett and J. F. Somers.

Work is being completed on the new machine shop for the Electric Hose & Rubber Company, Twelfth and Dure streets, Wilmington, Del.

The A. B. Howell Company, Wilmington, Del., has been incorporated with a capital of \$25,000, to manufacture machinery and engines. A. B., E. T. and G. Howell, Wilmington, are the incorporators.

New England

BOSTON, Mass., April 2, 1917.

The Wire Wheel Corporation of America, now being financed with \$8,000,000 8 per cent preferred stock and 100,000 shares of common stock of no par value, has purchased the Hendeeville plant, Springfield, Mass., of the Hendee Mfg. Company, and will at once develop it to manufacture 2000 to 3000 wire wheels per day. The company has purchased the Houk Mfg. Company, Buffalo, N. Y., and the American rights of the Rudge-Whitworth patents and has acquired the Dunlop, Cowles, House and Houck patents, the entire group covering every phase of wire wheel manufacture. John F. Alvord, president of the Torrington Company, and the Hendee Mfg. Company, will be at the head of the new enterprise.

The Eastern Bolt & Nut Company, East Providence, R. I., will build a two-story machine shop, 50 x 196 ft.

The Langelier Mfg. Company, Providence, R. I., has plans for a new machine shop, 33 x 191 ft., two and three stories.

The Carver Cotton Gin Company, East Bridgewater, Mass., has begun the erection of a one-story addition, to cost about \$10,000.

The Crescent Company, Meriden, Conn., has been incorporated with a capital of \$25,000 to manufacture hardware specialties. Lloyd E. Jennings is president.

The Bristol Brass Company, Bristol, Conn., has awarded the contract for a steel addition, 48 x 240 ft., one story, to its foundry.

The Providence Fittings Company, Boston, has been incorporated with a capital stock of \$25,000 to manufacture pipe fittings, etc. The directors are Guy F. Bullard, president; Frank DeW. Washburn, 93 Haverhill Street, Boston, treasurer, and J. O. E. Johnson.

The Lamprey Company, Westfield, Mass., has been incorporated with a capital stock of \$15,000 to manufacture arch plates and boilers. The directors are Joseph B. Ely, president; Ethel L. Lamprey, 43 Broad Street, Westfield, treasurer, and E. A. Sundburg.

The American Saw & Mfg. Company, Springfield, Mass., has bought a tract of land at Boylston Street and Boylston Avenue on which it will build a new plant, 75 x 200 ft., one story. The company expects to move from its present factory at 41 Taylor Street in June.

The Bridgeport Brass Company, Bridgeport, Conn., plans to increase its capital stock from \$2,000,000 to \$5,000,000.

The Singer Sewing Machine Company, Bridgeport, Conn., will enlarge its plant at Barnum Avenue and East Main Street, by the addition of a five-story concrete structure, 50 x 250 ft., to house the screw department.

The Coppus Engineering & Equipment Company, Worcester, Mass., has bought the factory buildings on Park Avenue, formerly occupied by the Hill Dryer Company, and will remove its plant there. This will give it about five times the floor space of its present location.

The New Haven Clock Corporation, New Haven, Conn., plans to increase its capital stock from \$1,000,000 to \$1,750,000.

The Chase Metal Works, Waterbury, Conn., has changed its corporate name to the Chase Companies, Inc.

The National Abrasive Company, Boston, has been incorporated with a capital stock of \$300,000. The directors are Nathan C. Harrison, president; Richard C. Harrison, Haverhill, treasurer, and J. T. Johnston.

The Marlin Arms Company, New Haven, Conn., has taken over the business and plant of the Mayo Radiator Company, New Haven, and will continue the manufacture of automobile radiators. Virginus G. Mayo will be factory manager.

The Speedometer Parts Company, Boston, has been incorporated with a capital stock of \$25,000. The directors are Rollin Abell, president; Frank M. Wyman, 41 Evelyn Street, Mattapan, treasurer, and G. M. Greene.

The Bela Body Company, Amesbury and Framingham, Mass., will begin at once the construction of an addition, 150 x 200 ft., one story, to its Framingham plant.

The Charles Spring & Forge Company, Cambridge, Mass., has been incorporated with a capital stock of \$10,000. The directors are H. G. Davis, president; William F. Bleyer, 11 Harvard Terrace, Allston, treasurer, and H. Nagel.

The Carlyle Machine Company, Manchester, Conn., has bought a tract of land adjoining its present plant with a view to further expansion in the near future.

The Housatonic Shipbuilding Company, Stratford, Conn., has been incorporated with \$3,000 in cash paid in, to build

wooden ships. It has acquired 40 acres of land, belonging to Simon Lake of the Lake Torpedo Boat Company, on the Housatonic River. Frederick E. Morgan is president and Carl Foster is treasurer. As Mr. Morgan and Mr. Foster are attorneys it is understood that they represent a group of capitalists, including Mr. Lake, who are back of the venture. It is reported that the new company intends to start work on 10 schooners.

The Bridgeport Brass Company has bought the business and factory buildings of the Standard Brass & Copper Tube Company, New London, Conn., and intends to greatly enlarge the latter plant. The Bridgeport Brass Company, according to Guy P. Miller, secretary and treasurer, has been unable to secure the land necessary for expansion in Bridgeport without paying an exorbitant price for it and has taken over the New London property in order to be in a position to fill its large Government contracts.

Chicago

CHICAGO, ILL., March 31, 1917.

The most important inquiry before the trade is that issued about a week ago by Armour & Co., for delivery at Chicago and South St. Paul. A great deal of heavy equipment is specified, which indicates that the tools are to be used in car repairs and car refrigerator work. Altogether about 45 machine tools and one crane are wanted. The list embraces 8 lathes of from 14 to 60-in. swing, a radial drill, 3 upright drills, 2 boring mills, 1 milling machine, 1 shaping machine, 1 power saw, 1 10-ton crane, 1 bolt cutter, 3 grinders, 6 punch and shearing machines, 1 bending roll, 1 flanging clamp, 2 steam hammers, 1 bulldozer, 1 cold saw, 1 alligator shear, etc. A detriment to prompt delivery on many of these tools is that motor drive is specified in most instances and deliveries on motors are far behind.

The Chicago, Milwaukee & St. Paul list of about 20 tools is open, and probably will not be closed for a few weeks. The Santa Fe likewise has some orders to place, and there is other prospective railroad buying.

General conditions continue very satisfactory, some of the dealers having found March a better month than February and equal to January. Tools which are used by the automobile and tractor manufacturers are in heavy demand, and deliveries show little or no improvement. Buyers are eager for second-hand machines when they can find them. Deliveries on engine lathes under 20 in. and of some hand-screw machines are comparatively easy, largely because of the machines which were placed on the market as the result of war demand.

Prices on several standard machines have again been advanced, this being particularly true of radial drills. Road improvements throughout the country are making the cement industry very busy, and there is a consequent demand for cement-making machinery which has been felt to a pronounced degree by the machine-tool trade.

The Hurley Machine Company, Chicago, is planning the erection of a factory for the manufacture of washing machines and vacuum cleaners at Taylor and Campbell Streets, at an estimated cost of \$400,000. W. A. McGuire, an engineer formerly connected with the Ford Motor Company, is devoting himself to the preparation of the plans which provide for many welfare features, such as a gymnasium, first-aid hospital, laundry, rest room, shower baths, restaurant, etc.

The Cushman Auto Tool Company, Champaign, Ill., has been incorporated with a capital stock of \$150,000, to manufacture tools and machinery. The incorporators are George M. Cushman, M. H. Cushman and B. Shaw Nightingale.

The Moline Machinery Company, Moline, Ill., has been incorporated with a capital stock of \$50,000, to manufacture machinery. The incorporators are C. W. Fisk, C. Hunt, C. T. Rosborough and H. Ainsworth.

The Freeport Machine Works, 41 Exchange Street, Freeport, Ill., has bought a site, and will immediately begin the erection of a brick machine shop, 40 x 120 ft. The firm does general machine work.

The Elgin Motor Car Corporation, Chicago, is planning the erection of additional factory buildings, which will triple its floor space.

It is authoritatively stated that the Gary plant of the Union Drawn Steel Company, Gary, Ind., will go into operation about May 15. President F. N. Beegle visited the plant recently in connection with the installation of machinery and equipment. The company is confronted with some difficulty in the matter of housing its employees, about 300 of whom will be engaged at the new plant at the start.

It is reported that the American Refractories Company contemplates additions to its plant at Danville, near Tilton,

which may double the capacity of the works. The Danville plant has been improved with about \$75,000 worth of equipment in the past year, and has been working double shift, but has been unable to keep pace with orders.

The Marshall Castings Company is to be established in South Haven, Mich., in buildings which are to be built by the South Haven Board of Trade.

A machine-shop addition, 40 x 45 ft., to cost \$10,000, will be built by the Northern Pacific Railway at Brainerd, Minn. H. E. Stevens, 1210 Railroad Building, St. Paul, is chief engineer.

The Chicago Screw Company has purchased 20 acres on the Chicago & Western Indiana Belt Line, in the northwestern part of Chicago, and in the near future will erect a group of buildings. The company is at present located at Fillmore Street and Homan Avenue, but has outgrown its present plant. Its new site contains about 850,000 sq. ft. The plans for the new plant provide for modern facilities which do not overlook the comfort and welfare of the employees.

Bids are being taken on a one-story factory, 50 x 130 ft., on Carroll Avenue, near Wood Street, Chicago, for the E. Reed Burns Metal Polish & Supply Company, 414 North Morgan Street. The architect is Harry H. Richards, 327 South LaSalle Street.

Plans have been completed and bids are to be received at once on a 2-story mill and reinforced concrete factory, 120 x 200 ft., on Ravenswood Avenue, near Montrose Avenue, Chicago, for the H. G. Saal Company, manufacturer of tools and hardware specialties. William T. Brantitzky, 64 Randolph Street, Chicago, is the architect.

Contracts have been awarded for the malleable iron plant to be built for the Saginaw Malleable Iron Company, Saginaw, Mich., at a cost of \$170,000. The contracts were placed by the architect and engineer, Frank D. Chase, 122 South Michigan Avenue, Chicago.

The Campbell Transmission Company, 133 West Washington Street, Chicago, is taking bids through its architects, Davidson & Weiss, 53 West Jackson Boulevard, Chicago, for a machine shop, one-story, 62 x 230 ft., and a one-story forge shop, 32 x 60 ft., to be erected at Buchanan, Mich., at an estimated cost of \$45,000.

The Adjustable Piston Mfg. Company, maker of automobile pistons and piston rings, is planning the erection of a factory. The company has heretofore had its work done in various shops in St. Paul. Its office is located at 61 East Sixth Street, St. Paul, Minn.

The Shaefer Mfg. Company, Berlin, Wis., maker of wood-working, quarrying and other machinery, is adding equipment to double the size of its machine shop.

The contract for a locomotive repair plant to cost \$250,000 has been awarded by the Great Northern Railroad, the plant to be located at Superior, Wis.

The Royal Canner Mfg. Company has been incorporated in the State of Delaware with a capital stock of \$200,000, to manufacture canning machinery. The incorporators are Robert E. Barber, George W. Bince and J. C. Carlyle, all of Albion, Ill.

Plans for a larger foundry and other additions, to cost \$30,000, are being prepared for the Rock Island Mfg. Company, Rock Island, Ill.

The American Hoist & Derrick Company, St. Paul, Minn., has been an active purchaser of equipment in the past few weeks.

The Jackson Schmitz & Shanks Mfg. Company is planning to build a plant at 11 Desplaines Street, Chicago, to manufacture excavating machinery. The company was recently incorporated with a capital stock of \$20,000. Henry A. Schmitz, Appleton, Wis., is president.

The Pfanstiehl Company, manufacturer of electrical specialties, North Chicago, Ill., has incorporated in New York with a capital of 4000 shares of \$100 and 1000 shares no par value, with a working capital of \$405,000, and more recently it has increased this capital from 1000 shares no par value to 40,000 shares, and from \$405,000 to \$600,000 active investment. In addition to its electric iron department, it has added a rare metal line. J. M. Troxel is vice-president and treasurer.

The Famous Mfg. Company, East Chicago, Ind., manufacturer of farming implements, has increased its capital stock from \$205,000 to \$305,000.

The Commonwealth Motor Company, Chicago, a Delaware corporation, has filed notice of increase in its capital from \$200,000 to \$400,000 for expansion.

The Ely Vermillion Iron Company, Chicago, has been incorporated under Delaware laws with a capital of \$1,500,000. John F. Mahon, Charles R. Cole and Marion Lucas, Chicago, are the incorporators.

Milwaukee

MILWAUKEE, Wis., April 2, 1917.

Local machine-tool builders report no slackening in the strong demand as the result of the war crisis. Dealers also state that bookings continue at the same high level of recent months, and they do not look for any immediate restriction. Metal-working shops are booked up until after the end of the year, and are being pressed so hard by customers that capacity must constantly be increased. This is one reason for the insistent inquiry for single tools and small lots. Some orders for a number of machines, which can be called neither small nor large-lot, have been placed in recent weeks. Tool builders are yet 30 to 60 days behind on deliveries. Slight improvement is noted in the railroad transportation situation, although much difficulty is still encountered on Eastern shipments. Foundry capacity in this district continues to be increased on probably the most extensive scale ever known. Great activity is also noted in prime movers, due to the revival of hydroelectric and steam power projects. The general situation in the metal-working trades is reported to be perhaps the most satisfactory in several years.

The Osborné Casting Company, Racine, Wis., which started operations only a few weeks ago in a new plant, has been obliged to increase its capacity. Work was started March 27 on an addition more than one-half the size of the present foundry. Charles J. Holmes is secretary and general manager.

The Milwaukee Gas Specialty Company, 122 Second Street, Milwaukee, has awarded contracts for a two-story factory, 50x100 ft., on Clybourn, near Twenty-second Street, to be ready about June 15.

The Althouse-Wheeler Company, Waupun, Wis., manufacturer of well and cistern pumps, has disposed of its plant and business to the Star Pointer Pump Company, Menasha, Wis., which will move the works to Menasha at once and consolidate operations.

The Woodford Engineering Company, Barton, Wis., is preparing to build a two-story reinforced concrete shop addition, 45x120 ft.

The Ampco Rolling Mills Corporation, Milwaukee, has taken over the exclusive rights to manufacture sheet, rod, bar and wire form products under patents owned by the American Metal Products Company, which operates a foundry and machine shop at 671 Kinnickinnic Avenue, Milwaukee. E. M. McVicker, 1200 First National Bank Building, Milwaukee, is attorney and auditor.

The P. & B. Mfg. Company, Milwaukee, electrical supplies, has awarded contracts for a one-story brick, steel and concrete factory, 60x200 ft., at Frailey Street and Becker Avenue. The former plant at 184 Fifth Street was destroyed by fire early in February.

The Racine Motor Truck Company, Racine, Wis., is being organized with a capital stock of \$500,000 to erect a plant to manufacture motor trucks, etc. Details are indefinite. Charles F. and Fred H. Piggins, who have been engaged in wagon, axle and spring manufacture at Racine for some time, and Ira Miller, Los Angeles, Cal., are promoting the enterprise.

H. W. Timmer, Waldo, Wis., has disposed of his machine shop and business to Clarence Beeckler and Henry Soerens, who took possession March 26.

The Boone Tire & Rubber Company, Des Moines, Iowa, and Sycamore, Ill., has concluded arrangements with the Progressive League, Chippewa Falls, Wis., for the establishment of a third plant in that city. Local capital has subscribed for \$28,000 of the capital stock on condition that a shop building costing \$20,000, with equipment costing \$25,000, be erected. Work will begin about April 15. H. C. Griffing, assistant general manager, will supervise the erection and equipment of the plant.

The South Side Malleable Castings Company, Fourteenth Avenue and the Chicago & Northwestern Railroad, Milwaukee, is increasing the capacity of its plant from 60 to 75 per cent by several additions to be completed about June 1. The new structures consist of a foundry, 120x150 ft.; shipping room, 100x100 ft.; hard iron room, 75x100 ft.; pumping mill room, 50x100 ft.; core room, 40x75 ft.; concrete sand, coal and coke bins, and office building, 50x75 ft. The original shop is 120x250 ft. All equipment has been purchased. Between 175 and 200 molders are employed. The capacity, when improvements are completed, will be in excess of 12,000 tons per year. Fred A. Lange is president and general manager.

The Milwaukee Electric Railway & Light Company, Milwaukee, has plans for the establishment on the shore of Lake Michigan of a steam power generating unit of 65,000 kw. or 87,000 hp., which ultimately will be increased to 200,000 kw. The site consists of more than 200 acres. Construction has begun. The first unit will be all-shaped, 190x100 ft. and 190x250 ft., 80 ft. high, of reinforced concrete and steel. The boilers will operate at 300 lb. pressure and 200 deg. superheat.

The initial generating installation will consist of three steam turbines. S. B. Way is vice-president and general manager.

The West Bend Aluminum Company, West Bend, Wis., manufacturer of kitchen utensils and sheet aluminum goods, has not definitely given up the idea of building additions on account of present high prices. It has rented its former quarters for storage purposes only and will not equip them with new machinery, as has been stated.

The J. W. Hewitt Machine Company, Neenah, Wis., is having plans prepared for a two-story machine-shop addition, 60x120 ft. and 50x60 ft., of brick, concrete and hollow tile.

The Bucyrus Company, South Milwaukee, Wis., is building a steel and brick addition to its erecting shop, 60x180 ft.

The Steiner Mfg. Company, Plymouth, Wis., maker of gasoline engines, has been reorganized by increasing the net assets to \$16,000. It will resume operations at once.

The Simple Gas Engine Company, Ashland, Wis., is moving its plant and equipment to Menasha, Wis., where it will occupy the former plant of the Eureka Cooperage Company. Operations will be resumed about April 15.

The Common Council, Madison, Wis., has voted a bond issue for constructing a water-softening plant in connection with the municipal waterworks system, at a cost estimated at \$150,000 to \$175,000. O. S. Norsman is city clerk.

Escanaba, Mich., has issued \$30,000 in bonds to provide for constructing and equipping a manual training school addition to the present high school building.

The Aluminum Goods Mfg. Company, Manitowoc, Wis., will not erect a building at Sheboygan, Wis., as has been stated, but will construct a building at Newark, N. J.

The Sparta Iron Works, Sparta, Wis., has awarded a contract for an addition to double its plant. When completed, the force of 40 workmen will also be increased to 75 or 80 men.

The American Mfg. Company, Sheboygan, Wis., manufacturer of chairs, will build a four-story addition to its wood-working shop, 70x180 ft., of brick and mill construction. W. C. Weeks, Sheboygan, is the architect.

The Washington Cutlery Company, Watertown, Wis., will enlarge its plant by the erection of a two-story brick and concrete addition, 54x60 ft.

The Beutlich Canning Machinery Company, Milwaukee, has been incorporated with \$10,000 capital by Richard F. Beutlich, engineer, 459 Van Buren Street, John F. and Albert J. Muckerheide.

Cleveland

CLEVELAND, OHIO, April 2, 1917.

The demand for automatic screw machinery has become decidedly more active the past few days and a local manufacturer has taken two export orders for 50 machines, each for shipment to England and Japan. Although it is known that the volume of machine-tool business for the Allies has been curtailed because of restrictions resulting partly from the more vigorous submarine warfare, the extent of this restriction is probably not generally realized. Light on this subject was shed by the receipt of information by a local manufacturer a few days ago, from its representative in England, to the effect that he had been permitted to forward recently only 8 per cent of his orders for American machines. To conserve the ocean vessel capacity the British Government is following a policy of allowing orders to come to this country only for such machinery that must be had. If equipment is available in British plants for doing the work, authorization for sending orders to American manufacturers is refused. Machinery manufacturers, however, are finding consolation in the belief that orders now being held up will doubtless come through later. While no lists of any size came out the past week, dealers report that the demand for small lots and single machines continues fairly active. Much additional second-hand machinery is being thrown on the market because of the completion of munition contracts by manufacturers in the Central West.

The Lakewood Engineering Company, Cleveland, has under way two extensions, one an erecting shop, 75 x 300 ft., to be equipped with a 10-ton crane, and a machine shop and stock room, 90 x 200 ft. Machinery equipment, amounting to about \$50,000, has been purchased. The company has recently added to its line of factory trucks and concrete mixers the manufacture of storage battery factory trucks and tractors and industrial and mine locomotives. H. W. Sykes is manager of this department.

The Templar Motors Corporation, Cleveland, has acquired a 14-acre site on West Madison Avenue, where it contemplates the erection of an automobile plant.

The Taylor, Vaughan & Taylor Company, Cuyahoga Falls, Ohio, will enlarge its plant by the erection of a two-story

concrete building, 34 x 90 ft. Some new machinery will be installed.

The Marathon Tire & Rubber Company, Cuyahoga Falls, will erect a power plant of 5000 kw. capacity.

The Holmes Automobile Company, Canton, Ohio, has purchased the east end plant of the Republic Stamping & Enameling Company, which it will equip to manufacture automobiles. It includes a power house, main factory and warehouse buildings. A main assembly building, about 200 x 250 ft., will be provided. It is stated that over \$300,000 was involved in the transaction. The Republic Stamping & Enameling Company announces that it is preparing plans for large extensions to its west plant to replace the one just sold. It is stated that approximately \$500,000 will be expended in these additions, which will include a power plant and additions to the stamping and other departments. The extensions will provide six acres of floor space.

The Wise Furnace Company, Akron, Ohio, will enlarge its plant by the erection of two wings to the foundry building each 41 x 55 ft., and two storage buildings, 35 x 80 ft., and 56 x 89 ft., respectively.

The Hydraulic Press Mfg. Company, Mt. Gilead, Ohio, which has decided to rebuild its plant, instead of removing to Columbus, will erect four new buildings, including a machine shop, 100 x 200 ft., a power house, forge shop and stock room. A 20-ton traveling crane and two 3-ton cranes will be installed in the machine shop. A 300-hp. Corliss engine, a 300-hp. power boiler, and a 200-kw. generator will be installed in the power plant.

The Findlay Steel Castings Company, Findlay, Ohio, which has acquired the plant of the Grant Motor Car Company, Findlay, will enlarge the building by the erection of a foundry, 60 x 250 ft.

The Peerless Weighing Machine Company, Detroit, Mich., will establish a branch factory in Mansfield, Ohio, where it has taken over the building of the Herring Buggy Company, a three-story structure, 80 x 200 ft.

The Mineral City Mfg. Company, Mineral City, Ohio, has been incorporated with a capital stock of \$25,000 to manufacture pressed steel nuts, air valves for automobile engines and drill presses. L. B. Green is president.

The American Road Machinery Company, Delphos, Ohio, will make improvements to its foundry and install a conveyor system and other equipment.

Indianapolis

INDIANAPOLIS, IND., April 2, 1917.

The Burnoil Engine Company, South Bend, Ind., has increased its capital stock from \$50,000 to \$275,000.

The Gould Motor & Mfg. Company, Marion, Ind., has been incorporated with \$100,000 capital stock to manufacture motors, automobiles and aeroplanes. The directors are J. A. Hardman, Frank Barr and George W. Unger.

The D. H. Work Mfg. Company, Plymouth, Ind., incorporated with \$10,000 capital stock, will manufacture automobiles. D. H. Work is president.

The Nappanee Utilities Company, Nappanee, Ind., has been incorporated with \$75,000 capital stock to supply water, light, heat and power. The directors are John Hartmen, Willard A. Price and Burton A. Ulline.

S. F. Bowser & Co., manufacturers of tanks, etc., Fort Wayne, Ind., have increased their capital stock from \$800,000 to \$1,250,000.

The Gary & Hobart Traction Company, Gary, Ind., has been incorporated with \$60,000 capital stock to construct and operate street railway lines between Gary, East Gary, New Chicago and Hobart and to furnish light, heat and power to these cities. The directors are William Earle, Ora L. Wildermuth, Harlan Stratton, Grant Crumpacker and Adlai T. Ewing.

The Warsaw Wood Products Company, Warsaw, Ind., has been incorporated with \$100,000 capital stock to build cabinets, tables and toys. The directors are C. H. Ker, W. L. Groth and A. W. Wenger.

The metal department of the Century Mfg. Company, Connorsville, Ind., was destroyed by fire March 29 with a reported loss of \$150,000. The plant will be rebuilt. William B. Ansted is president.

The Orestes Silo & Concrete Products Company, Orestes, Ind., has been incorporated with \$35,000 capital stock to manufacture silos and cement products. The directors are Elmer M. Helm, Ora Blake and Harry M. Adams.

The Ogburn Tractor Company, Indianapolis, has been incorporated with \$100,000 capital stock to manufacture gas tractors. The directors are A. R. Ogburn, Des Moines; H. R. Ogburn and J. R. Datwyler, Peru, Ia.

The C. H. Anschutz Mfg. Company, Indianapolis, has been incorporated with \$30,000 capital stock to manufacture cooking utensils. C. H. Anschutz, Henry N. Anschutz and Ernest E. Anschutz, all of Wilson, Kan., are the directors.

The International Spark Plug Company, Indianapolis, has been incorporated with \$10,000 capital stock to manufacture spark plugs. The directors are Eugene Blackburn, Robert A. Blackburn and Elbert N. Copple.

The Anderson Steam Vulcanizer Company, Worthington, Ind., has been organized with \$10,000 capital stock to manufacture a vulcanizer. Newton M. Anderson is president.

The Metal Forming Corporation, Elkhart, Ind., has been incorporated with \$200,000 capital stock to smelt, forge and coat metals. The directors are Evan C. Harter, William F. Stanton and Edward B. Zigler.

The Northern Foundry Company, Laporte, Ind., has been incorporated with \$15,000 capital stock to do general foundry work. Frederick H. Krause, M. Krause and Benjamin C. Rees are the directors.

Detroit

DETROIT, MICH., April 2, 1917.

Machine-tool dealers report an unusually large business the past week, with total orders greater than for several months. One company alone sold 18 lathes in two days to different companies, to be delivered in from two to three months. Deliveries are still extremely slow. Machines ordered for delivery two and three months ago will not be delivered for several weeks yet, due to shortage of materials reported by manufacturers. Business opened up to a remarkable degree last week in the automobile and accessory lines, and automobile and metal industries, especially those working with copper, brass and aluminum, report business the best they have known in years. The coal shortage has been practically overcome, and transportation has opened up, railroads now furnishing the cars demanded of them. Ship-building companies are working to capacity, one, the Great Lakes Engineering Company, landing an order for 29 steel freighters to cost \$16,000,000. Skilled workmen are in demand, and with the opening of the construction season unskilled labor will be less than the demand, in spite of the \$4.50 a day wage being paid.

A fire at the Chalmers Motor Company's Canadian plant at Windsor, Ont., did \$250,000 damage and will hold up production for 10 days. Officials state that the plant is in such condition that it can be reconstructed in a short time.

The Linderman Steel & Machine Company, Benton Harbor, Mich., has secured a contract to make 6-in. shells for the United States Government.

R. E. Olds, Lansing, Mich., head of the Reo Motor Car Company, is organizing a corporation capitalized at \$1,000,000, to manufacture farm tractors on a site near Tampa, Fla., in the new city which Mr. Olds is creating at the head of Tampa Bay.

The Menominee Motor Truck Company, Menominee, Mich., has announced plans for enlargement, to double its output of the trucks.

The Hackett Motor Car Company, formerly of Jackson, Mich., has selected a site at Grand Rapids, Mich., and will shortly begin the construction of a building. F. R. Rothwell, Jackson, is secretary.

E. L. Smith, Alma, Mich., has purchased the building formerly used by the Deal Buggy Works, at Jonesville, Mich., and will manufacture auto truck bodies and other automobile accessories.

The Hoover Steel Ball Company, Ann Arbor, Mich., announce a spring building program, which includes the construction of the header department, a one-story brick building, 200 x 400 ft.

The Elwell Trolley Supply Company, Ann Arbor, Mich., has broken ground for a new one-story cement structure, 156 x 40 ft., including a brass foundry.

The Clipper Belt Lacer Company, Grand Rapids, Mich., has begun work on an addition, 65 x 100 ft., to cost \$20,000. It will house the automatic machine department. The capacity of the plant will be doubled.

The Ontario, Canada, plant of the Kelsey Wheel Company, Detroit, was damaged by fire with a total loss of \$10,000.

John Redmond and A. Hanshaw, Detroit, will establish a factory at Lapeer to manufacture steel axles and wagon tongues.

The Can-a-Ford Company, Sparta, Mich., with headquarters at the Baldwin Mfg. Company, expects to begin the manufacture of a tractor attachment for a Ford car within the next 30 days. The company expects to use steel and cast-iron tractor wheels and cold-rolled steel axles.

The Dachel-Carter Boat Company, Benton Harbor, Mich.,

is rushing the construction of a 40-ft. cabin power cruiser ordered by the United States Government.

The Jordan Steel Mfg. Company has closed a deal whereby it will move from Hastings to Charlotte, where a new building 75 x 25 ft. will be built.

The Ireland & Matthews Mfg. Company, Detroit, manufacturer of stove trimmings, sheet-metal goods, automobile specialties, etc., has not manufactured any munitions now for about seven months, but is confining its business entirely to its regular lines.

Cincinnati

CINCINNATI, OHIO, April 2, 1917.

In the month of March the call for some of the larger-sized machine tools was almost unprecedented. Planing machines headed the list, with milling machines and large lathes following in the order named. The demand is principally from the large equipment manufacturers, and also from the steel mills. Local machine-tool makers rather welcome the letup in business from the railroads. Shaping machines and the smaller-sized lathes are only in fair demand, orders being scattered and not confined to any particular section of the country. The export business is holding up fairly well as far as Europe is concerned, but Canadian firms are not buying many machine tools just now.

In spite of the high costs of building materials and labor, the Cincinnati building commissioner's report for the month of March shows that permits representing an estimated valuation of \$1,300,000 were issued during that month, or an increase of \$238,865 over March, 1916.

The Fosdick Machine Tool Company, Cincinnati, has had plans prepared for an addition to its plant, 50 x 250 ft., one and two stories, of brick, steel and concrete. It is reported, but not officially confirmed, that the company will add to its power plant equipment at an early date. N. B. Chace is general manager.

The Cincinnati Planer Company, Oakley-Cincinnati, has broken ground for an addition to its main shop, 80 x 160 ft., with sawtooth roof, of brick and steel construction. Practically all of the equipment will be of its own manufacture. B. B. Quillen is vice-president and general manager.

The Lippincott Company, Cincinnati, catsup manufacturer, is having plans prepared for a plant to be erected at Osgood, Ohio. The powerhouse equipment will include two 225-hp. boilers.

The Auto Products Mfg. Company, Cincinnati, has been incorporated with \$12,000 capital stock by Clifford Greene and others, to manufacture automobile parts. Its present plant is in Oakley, and tentative plans are under way for adding a forging plant. Details will not be available for several weeks yet.

The Edna Brass Mfg. Company, 525 Reading Road, Cincinnati, Ohio, is having bids taken by its engineer, the Reliance Engineering Company, 311 Fourth National Bank Building, Cincinnati, for the erection of a two-story machine shop, 93 x 117 ft. Isaac Joseph is president of the company.

Power plant and lighting equipment will be required for the Montgomery County Children's Home, Dayton, Ohio. Bids will be opened April 25 by Charles F. Brenner, president of the board of commissioners.

Work has been commenced remodeling the plant of the American Mechanical Toy Company's plant at Dayton, Ohio, recently destroyed by fire.

The Manufacturers' Production Company, Dayton, Ohio, has let contract for an addition to its plant, 72 x 190 ft., two stories, of brick and concrete.

The Darling Motor Company, Dayton, Ohio, incorporated several weeks ago, has acquired the buildings of the Wright Aeroplane Company and will fit them up for the manufacture of automobiles. The Wright plant has been moved East.

The Lindner Brothers Sanitary Milk Company, Dayton, Ohio, will soon have plans prepared for a new power house for which equipment will be required.

The John Immel & Sons Company, Columbus, Ohio, has acquired a site on East Livingston Avenue, on which it will erect a machine shop, 36 x 53 ft., two stories, of steel construction. Only a limited additional amount of equipment will be required.

The Meteor Motor Car Company, Piqua, Ohio, intends to increase the capacity of its plant at an early date. A power plant addition is one of the improvements planned.

The Hill-Standard Company, Anderson, Ind., is having plans prepared for an addition to its plant estimated to cost \$50,000. Nothing is known as to machinery requirements.

The Central South

LOUISVILLE, KY., April 2, 1917.

Inquiries have been numerous the past week for power equipment, including boilers, engines and motors. Some belated ice manufacturing equipment has been ordered. Contractor's equipment, quarry drills and air compressors and some wood-working needs are reported. Structural steel is represented more by inquiries than orders, and there are a number of bridge and building projects which will likely wait until steel goes lower. Activities in the way of military preparedness are reflected here only indirectly. Coal contracts are being signed for the year on an unprecedentedly high basis.

The T. W. Minton & Son Hickory Mills, Barbourville, Ky., are being improved, new equipment including a 150-hp. boiler.

J. J. Korb, Henry Powell and L. W. Walden, Seebree, Ky., have purchased the lighting plant and franchise of G. T. Carnal and are installing a new generating station for which they have purchased two 25-hp. Fairbanks-Morse oil engines, with accessory equipment.

The Southern Machinery Exchange, Somerset, Ky., has been organized and is in the market for used machinery, including complete plants.

Peter Jacobson & Sons, New Albany, Ind., will rebuild the furniture factory destroyed by tornado with a loss of \$18,000.

The Kahler Furniture Company, New Albany, Ind., which lost its \$75,000 plant in a recent tornado, is considering relocation in Detroit, Mich. Ferdinand Kahler is president.

Birmingham

BIRMINGHAM, ALA., April 2, 1917.

Mining requirements keep machinery dealers busy. There never was such great activity both in old and in the building of new plants in the South before.

O. L. Stephenson, H. O. Bernard, and others, have acquired the properties of the Southern Pipe & Foundry Company, Birmingham, and have reorganized with a capital stock of \$2,000. They will manufacture cast-iron drainage pipe and later on soil pipe and fittings.

The Hill-Griffith Company, William L. Oberhelman, Southern manager, will erect a mill to grind and refine crude graphite in Birmingham. It will cost around \$30,000.

Harry Watkins, H. O. Moore, E. N. Hamill, and others, have incorporated the Central Graphite Company, Birmingham, and will build a graphite mining plant costing \$75,000 in the Ashland field.

St. Louis

ST. LOUIS, MO., April 2, 1917.

The general hesitancy in business is not due to depression, but to a desire to meet any new conditions that may arise. The machine-tool business is expected to show sharp improvement once the uncertainty is out of the way.

The Wagner Electric Company, St. Louis, which has just finished a munitions contract, is holding its force of 3600 employees together to await possible American war needs.

The Missouri Enameling & Mfg. Company, St. Louis, has been organized by B. F. DeVorak, Arthur A. Roesch, Belleville, Ill.; W. J. McConnell, Fred O. Lutz and Emil A. Blaho, and is in the market for about \$15,000 worth of metal-working equipment.

The Equipment Motor Truck Company, St. Louis, Mo., has been incorporated with a capital stock of \$50,000 by H. J. Dunker, S. M. Laithe and W. A. Yackey, Jr., to manufacture and repair motors and motor trucks.

The Sinclair Oil & Refining Company, Tulsa, Okla., Harry F. Sinclair, principal stockholder, is planning to erect a refinery at St. Louis to cost \$1,000,000. A pipe line to St. Louis from the Oklahoma oil fields, to include heavy oil pumping stations, etc., is also contemplated.

The Laclede Chemical Company, St. Louis, Mo., has been organized by C. L. Swarts, E. C. Edmiston, and others, for the manufacture of coal-tar products. It will require about \$15,000 worth of machinery.

The Weber Implement Company, St. Louis, is having a building equipped for a repair and manufacturing plant for motors, machinery, automobiles, etc.

The North American Electric Lamp Company, St. Louis, has been organized by Isaac H. Cohn, Charles M. Rice, and George Bentsner, and will install about \$15,000 worth of equipment.

The Alexander Rindskopf Interiors Corporation, St. Louis, has been organized by Alex C. Rindskopf, and others, and will install about \$10,000 worth of wood-working machinery.

The Western Sanitary Fountain Company, Kansas City, Mo., has been incorporated with a capital stock of \$50,000 by D. C. Main, W. C. West and George C. Hufft to manufacture drinking fountains.

The St. Clair-Cudahy Pipe Line Company has bought a site at La Plata, Mo., and is in the market for about \$100,000 worth of equipment for a pumping plant in connection with a pipe line from Oklahoma to northern Indiana.

The Shallow Water Boat Company, New York, N. Y., has acquired the plant of the Ripley Steel Boat Company, Alton, Ill., and will remodel it to manufacture submarine chasers and similar craft.

The Kardell Tractor & Truck Company, St. Louis, Mo., has been incorporated in Delaware with a capital of \$1,000,000 to manufacture trucks, plows and kindred machinery. H. W. Kardell, J. C. Kardell and H. F. Fahrenkrog, St. Louis, are the incorporators.

The corporate name of the Southern Illinois Machine & Foundry Company, Murphysboro, Ill., was changed on April 1 to the Egyptian Iron Works. No change will be made in the officers of the company. The products of the company include iron and brass castings, hoisting cages, mine cars, structural material for buildings, etc. The present quarters of the company have been outgrown and the erection of a new foundry building and carshop for manufacturing complete mining cars of all descriptions, together with other mining equipment is contemplated. E. L. Bencini is president and H. A. Bastien is secretary.

Sam W. Shock, Elona, Ark., will re-equip his 7-stand cotton gin recently burned. About \$7,500 worth of machinery will be required.

The Rockwell Mfg. Company, Camden, Ark., will equip a wood-working plant at a cost of about \$250,000 to replace one recently destroyed by fire.

The Okmulgee Brick Manufacturing Company, Okmulgee, Okla., has been incorporated with a capital stock of \$40,000 by W. B. Pine, J. W. Hammond and G. W. Mabrey, and will buy brick presses and other clay-working machinery.

Frederick, Okla., will buy about \$35,000 of electrical equipment for the municipal plant. J. O. Morris is city clerk.

Skiatook, Okla., will improve its electric plant and is in the market for about 100 hp. of boilers, a 100-hp. engine, 100-kw. generator and other equipment. C. H. Cleveland is the mayor.

Stratford, Okla., will purchase about \$2,000 of additional electric equipment.

Red Rock, Okla., J. M. Mitchell, clerk, is in the market for waterworks equipment, including two triplex pumps, oil engines, etc. The Benham Engineering Company, Oklahoma City, Okla., has plans and specifications.

Monroe, La., will expend \$61,000 for a new power house and reconstruction of its electric generating plant, also about \$146,000 on waterworks plant reconstruction. Walter G. Kirkpatrick, Jackson, Miss., is engineer in charge.

The Wichita Falls Foundry & Machine Company, Wichita Falls, Tex., will equip a brass and iron foundry at New Orleans, La.

The Marine Oil & Refining Company, Shreveport, La., will equip a refinery, install pumping stations of 1200 bbl. daily capacity, and is in the market for about \$150,000 worth of machinery.

The Besse-Henry Company, Shreveport, La., C. D. Shallenberger, president, is in the market for about \$15,000 worth of paint grinding machinery.

Texas

AUSTIN, TEX., March 31, 1917.

Many improvements to manufacturing industries and the installation of new machinery are taking place. Plans for building new cotton gins, cotton seed oil mills and cotton compresses are being held in abeyance pending information as to prospects of the coming season's crop.

The Independent Electric Light & Power Company, San Antonio, has been incorporated with a capital stock of \$30,000 to construct and operate an electric light and power plant. W. L. Cunningham is a stockholder.

The plant of the Wellington Power & Light Company, Wellington, was recently destroyed by fire. A new plant will be built to cost about \$15,000.

The San Antonio, Uvalde & Gulf Railroad will construct new machine shops at North Pleasanton at a cost of \$87,000. Plans and specifications are now being prepared at its general offices, San Antonio.

W. M. Seligson, Goliad, has organized the Cuero Gin Company, which will build a cotton gin at Cuero to cost \$13,000.

The West Texas Sulphur Company will install machinery

to cost about \$20,000 at its sulphur mine near Oris. M. S. Blackburn is vice-president and general manager.

The Texas Airline Interurban Railway Company, Waco, has been incorporated for the purpose of constructing and operating five connecting interurban lines in Texas. The proposed roads are to have an aggregate length of about 121½ miles. The company has a nominal capital stock of \$250,000. It is not known what financial interests are back of the project. The stockholders named in the charter are J. D. Hunt, Caldwell, Tex.; H. H. Hunt, Columbus, Tex.; E. B. Hunt, Waco, and William Tait, Columbus.

California

LOS ANGELES, CAL., March 20, 1917.

The F. O. Engstrum Construction Company, Los Angeles, has acquired property on Fifteenth Street, near Alameda Street, for a shop to be equipped with machinery for bending, cutting and handling steel and iron. Wood-working equipment and similar apparatus will also be required. F. O. Engstrum is president.

Gragg Riley, Los Angeles, has leased property at 1046 South Olive Street for an assembling plant for a patented machine.

The American System of Reinforcing of California, 1116 Washington Building, Los Angeles, recently incorporated, is making rapid progress in the erection of its new plant at Torrance for the manufacture of round and square steel reinforcing bars. Equipment will be installed for bending and cutting operations, straightening wire and rolled bars, as well as for fabricating column spirals. Arrangements have been made with the Llewellyn Iron Works, with adjoining plant, to handle the rolling of the special steel bars. The company's specialties include straight bars, special deformed bars, girder and beam bars, column ties and special stirrups. All machinery will be motor-driven. D. J. Calkins is general manager.

John Turner, 620 East Sixth Street, Santa Ana, Cal., has filed plans for a one-story foundry at East First and Cedar streets.

The California Alkali Company, Cartago, Cal., recently organized, has commenced the erection of a plant to cost about \$500,000. R. G. Paddock is the company's agent.

The Pacific Northwest

PORTLAND, ORE., March 27, 1917.

Freight conditions as far as the Pacific Northwest is concerned are becoming worse instead of better, and the general situation is such that most of the small tool orders for this section are being brought in from Eastern factories by express. The demand for machinery and machine tools continues active, with the bulk of business coming from extensions to shipyards. The larger lumber companies are also planning extensions. The demand for tools for automobile repair shops continues.

Demand for contractors' equipment has been exceptionally heavy the past month. Extensive development work in the interior has brought out an increasing demand. Packing plants and canneries in great numbers are being erected throughout the fruit sections, and there has been greater call for this class of machinery than ever before.

Lumber industry shows the same conditions that have existed for some time past, heavily increasing balances in unshipped business, extreme car shortage, and a general disposition of the mills to close down in the event rail shipping relief is not soon forthcoming. Prices will probably be increased shortly if the car situation is not easier.

The Seattle Construction & Dry Dock Company, Seattle, Wash., will build a two-story frame mold loft and a crane shed at a cost of \$30,000.

The hoist, compressor and blacksmith shop on the Blue Star property of the Spokane Mines Development Association, Spokane, Wash., which were recently burned with a loss of \$15,000, will be replaced at once.

Plans have been completed for the reconstruction of the ocean terminal of the Pacific Coast Company, at Seattle, Wash., which was burned several months ago.

The Pocatello Foundry & Machinery Company, Pocatello, Idaho, has been incorporated with a capital stock of \$25,000.

The Automobile Boats Mfg. Company, Salem, Ore., has been incorporated with a capital stock of \$1,000,000.

The Blewett Harvester Company, Pendleton, Ore., is to construct its own foundry and will shortly be in the market for equipment.

The Dallas Iron Works, Dallas, Ore., has been purchased by Joseph Glath and John Cerny, and will install equipment, including a new wheel press and an acetylene welder.

The Electrical Equipment Company, Great Falls, Mont., has been incorporated with a capital stock of \$100,000. A. Van Dachenhaus will be president and general manager.

L. H. Gray of the L. H. Gray Company, and R. F. Guerin have taken an option on the Sanderson property at Ballard, Wash., and will establish another wooden shipbuilding plant. Orders for two boats have already been received.

Arno Mereen, general manager for the C. A. Smith Company, Portland, Ore., announces that its two new lumber carriers will be constructed at the Kruse & Banks yards in North Bend, instead of at the Standifer-Clarkson yards at Portland.

The Kitchen Utilities Company, Seattle, Wash., has been incorporated with a capital stock of \$50,000 by J. E. Lester and H. A. Martin.

The California-Oregon Power Company, Klamath Falls, Ore., will soon begin the erection of its new power house, to be capable of developing 50,000 hp.

The American Shipbuilding Corporation, Spokane, Wash., has contracted for the construction of eight 5-masted auxiliary schooners at its Warrenton, Ore., yards. The total cost will exceed \$2,500,000.

A. Reimann, Charles A. Edwards and Jesse Stearns, all of Salem, Ore., have incorporated the Margaret Shipbuilding Company with a capital stock of \$100,000.

The Pacific Construction & Engineering Company, Seattle, recently organized, has started foundation work on a plant for construction of heavy forgings, such as shafting, rudder posts, rudder stocks, stern frames, and similar steel ship construction work. The company, it is stated, now holds orders from Seattle, Portland, San Francisco and Vancouver shipbuilders, sufficient to keep its plant running night and day for months. Hydraulic forging presses will be installed in the plant. Robert C. Monteagle is president and general manager.

Robert E. Cavette, L. C. Smith Building, Seattle, is at the head of a syndicate that proposes to construct a shipbuilding plant in Seattle. A yard adjoining the plant will be equipped. It is stated, for the construction of submarine chasers.

J. Fred Larson, Portland, Ore., and associates plan the construction of a shipbuilding plant near Florence, Ore. A company will be organized with a capital stock of \$200,000, of which \$10,000 has been subscribed for in Florence, Portland investors adding \$150,000. The plant has contracts for three 2500-ton vessels.

The North Bend Box Factory, North Bend, Ore., has been leased by W. L. Clarke and C. W. Callahan of San Francisco, who plan improvements.

The Pacific Cold Storage Transit & Mfg. Company, Seattle, recently incorporated for \$1,500,000 by Oscar P. Dix, F. W. Doty and W. L. Overman, plans the construction of a plant to build refrigerator cars.

The West Waterway Boatbuilding Company, Seattle, has been incorporated and will establish a plant on the Seattle waterway for the building of fishing vessels, launches, and small craft.

The Everett Shipbuilding Company, Everett, Wash., has been incorporated for \$100,000, by D. W. Locke, A. J. Stohr, R. J. Weekin, A. W. Barber and S. W. Way and others. It plans to erect a plant in the city.

The Rainier Products Company, Seattle, has taken over the big brewery plant formerly operated by the Seattle Brewing & Malting Company, and has installed new machinery for manufacture of fruit drinks. Approximately \$250,000 additional will be expended in replacing the present equipment and preparing for operation.

The Pacific Coast Pipe Company, Seattle, recently secured contract for building a wood stave pipe line for a Pittsburgh firm, at a cost of \$260,000. L. M. Grant is manager.

Canada

TORONTO, ONT., April 2, 1917.

Sir George Foster and representatives of large Canadian shipbuilding interests held a conference at Ottawa looking to the speeding up of the shipbuilding industry. Contracts placed through the Imperial Munitions Board for commercial vessels aggregate more than \$25,000,000 and for other classes of ships the total is even greater. These bottoms must be turned out quickly, and it is hoped to better systematize the operations. Some firms have experienced difficulty in obtaining steel, but arrangements are being made to remove this obstacle.

The plans of the International Shipbuilding Corporation, Ltd., 323 Transportation Building, Montreal, recently incorporated with a capital stock of \$2,000,000, have been completed and the establishment of a plant at Newcastle, N. B., has begun. A sawmill and planing mill have been acquired and

an iron foundry will be purchased. A site has been secured with a water frontage of 1600 ft. The plant will be laid out by B. B. Crowinshield, Boston, Mass. Among the stockholders are E. A. McCurdy and D. H. McNaught, both of Newcastle.

The Hydro-Electric Commission of Ontario, Sir Adam Beck, chairman, plans to spend \$6,928,790. Of this \$1,000,000 is for work on the Niagara Power Development.

John A. Pearson, architect, Central Block, Parliament Buildings, Ottawa, will receive bids until April 21 for steam boilers and stokers required for the central heating plant for the Parliament Buildings. All tenders are to be based on supplying and erecting three 500-hp. water-tube boilers, together with fittings and soot blowers. Separate quotations are also asked for supplying and erecting in connection with the boilers 3 automatic stokers. One boiler and stoker are to be erected complete within five months from the date of contract and the other two to be erected before Jan. 1, 1918. Plans and specifications may be obtained from the Peter Lyall & Sons Construction Company, Ltd., Ottawa.

The Paper & Hardware Products, Ltd., Montreal, has been incorporated with a capital stock of \$49,000 by Wilfred A. Lyons, Henri Larin, Patrick A. Donnelly, and others.

The Munro Wire Works, New Glasgow, N. S., was destroyed by fire with a reported loss of about \$25,000. It is expected that the plant will be rebuilt.

The Motor Vehicles of Montreal, Ltd., Montreal, has been incorporated with a capital stock of \$20,000 by O. Legrand, G. Demers, L. E. Beauregard, and others, to manufacture motor trucks, automobiles, etc.

Toronto proposes to install an additional pump and motor at Riverdale pumping station at a cost of \$25,000. R. C. Harris is commissioner of works.

The Elmira Transmission Company, Elmira, Ont., will build a molding shop and a machine shop on Church Street. E. Vise is manager.

The Boving Hydraulic & Engineering Company, Lindsay, Ont., will build an addition to its plant at a cost of \$20,000, and will be in the market for machinery.

A. E. Nutter, Dominion Bank Building, London, Ont., is preparing plans for a mill to cost \$150,000.

The Perfection Tire & Motor Company, Ltd., of Canada, 713 Marquette Building, Chicago, Ill., will purchase a site at Niagara Falls, Ont., on which it will erect a tire and motor plant to cost \$35,000. L. A. Rockwell is secretary.

The Canadian Consolidated Rubber Company has awarded the contract for a machine shop at Kitchener, Ont., to the Austin Company, Cleveland, Ohio, to cost \$40,000.

The Canadian Storage Battery Company, 17 Simcoe Street, Toronto, will establish a plant in Toronto to cost \$10,000.

The Dominion Glass Company will build a factory at Wallaceburg, Ont., at a cost of \$50,000.

Regina, Sask., is receiving prices for a pump with a daily capacity of 3,000,000 gal., with a direct-connected 2200-volt, alternating-current motor. Two similar units will be installed at a later date. J. R. Ellis, 2852 Rae Street, is the engineer.

E. C. Gatten, city clerk, Sherbrooke, Que., is in the market for a portable air compressor of 96 cu. ft. capacity per min., for the waterworks department.

The Canada Metal Company, Fraser Avenue, Toronto, is in the market for a 25-hp., three-phase, 25-cycle, 550-volt motor.

The Canadian Wood Molybdenite Company, Ltd., Ottawa, has been incorporated with a capital stock of \$1,000,000 by Oliver E. Wood, Harvey Fitzsimons, George D. Kelley, and others.

The Canada Lock Joint Pipe, Ltd., Winnipeg, has been incorporated with a capital stock of \$40,000 by Alexander Smith, William Carrie, Harold Spencer, and others, to manufacture pipe, machinery, etc.

J. R. Cameron, Ltd., Ottawa, has been incorporated with a capital stock of \$50,000 by Joseph R. Cameron, Roderick E. Byrne, John S. Nicholson, and others, to manufacture machinery, electrical goods, etc.

The Bagoda Mfg. Company, Ltd., Toronto, has been incorporated with a capital stock of \$150,000 by William A. McFarlane, 555 Palmerston Avenue, and others, to manufacture pulp, paper, etc.

George W. Cole, Ltd., Toronto, has been incorporated with a capital stock of \$50,000 by George W. Cole, James L. Ross, 20 King Street East; Lancing B. Campbell, and others, to manufacture machinery, tools, etc.

Brennens, Ltd., Hamilton, Ont., has been incorporated with a capital stock of \$600,000 by James S. Lovell, 25 King Street West; Charles D. Magee, 300 St. George Street, and others, to manufacture pulp, paper, etc.

Redcliffe, Alberta, proposes to spend \$30,000 for new machinery and alterations to its pumping station.

The Canadian Symphonola Company, Ltd., Toronto, has been incorporated with a capital stock of \$53,000 by John W. Dyer, 214 Westminster Avenue, and others, to manufacture musical instruments, etc.

The Nipissing Central-Railway car barns at North Cobalt, Ont., recently destroyed by fire with a loss of \$130,000, will be rebuilt. The company also lost about \$30,000 worth of electrical equipment.

The Sramotor Company, London, Ont., proposes to establish a foundry and machine shop at St. Thomas, Ont., to cost \$100,000. W. H. Heard is manager.

Dodge Brothers, Detroit, Mich., are making preparations for establishing a plant at Windsor, Ont., at a cost of \$100,000.

Beatty Brothers, London, Ont., are receiving bids for the erection of a brick and steel foundry, 140 x 160 ft., to cost \$50,000, and a cupola, two stories, 48 x 48 ft. Mr. Deacon is manager.

Hillsdale, Ont., will spend \$2,500 on the purchase of a gasoline engine and appliances for supplying electric light. T. D. Robinson, Moonston, Ont., is clerk.

The new plant for the Goodyear Tire & Rubber Company, New Toronto, Ont., will shortly be ready for the installation of machinery. When completed it will represent an outlay of \$1,500,000. The company has secured a site of 28 acres at New Toronto, and it proposes to build six factories of a similar size as its business warrants.

Government Purchases

WASHINGTON, D. C., April 2, 1917.

Bids will be received by the Bureau of Supplies and Accounts, Navy Department, Washington, April 24, for the following machines for Puget Sound: One 2½-ton electric traveling crane, two motor-driven 30-in. radial drills, one automatic cutter grinding machine for thread milling machine cutters; one 42-in. swing heavy forge lathe; one motor-driven milling machine, two screw machines, one 6 x 48-in. thread milling machine, and 17 expansion lathe mandrels.

The general purchasing officer of the Panama Canal, Washington, will receive sealed proposals until April 20, under circular 1136, for furnishing shop machines, chain blocks, etc.

The following bids were received by the chief signal officer, Army Department, Washington, March 24, for supplies for the signal corps under proposal 930:

Item 25, one welding and cutting outfit—Bid 8, \$314; 13, \$450; 17, units; 32, \$411.30; 33, \$234.25.

Item 26, one American Wadsworth 6-in. rotary table room for sand blasting—Bid 2, \$2,090; 9, \$1,435; 18, \$1,250.

Item 27, one automatic horse power hammer, 33 in.—Bid 7, \$359.50 and \$384.50; 8, \$346 and \$369; 9, \$380 and \$353; 20, units, 27, \$242; 28, \$200 and 275; 34, 360; 38, 399.

Item 28, one universal turret screw machine—Bid 35, 1,276; 39, \$1,310.

Item 29, one grinder—Bid 4, \$1,698.42; 7, \$610; 8, \$1,405; 34, \$1,698.

Item 30, one high power vertical milling machine—Bid 16 \$4,070; 34, \$2,778; 35, \$4,918; 37, \$4,991; 38 \$5,106.

Item 32, one 14 x 72-in. cylindrical grinding machine—Bid 7, \$3,466; 39, \$4,058.

Item 33, one pattern pipe cutting and threading machine—Bid 7, \$694; 8, \$694; 9, \$647.50; 27, \$620; 28, \$648; 34, \$680; 35, \$694; 37, \$595; 38, \$694; 39, \$694.

Item 34, one 30 x 30 in. x 8 ft. planing machine—Bid 7, \$3,000; 8, \$2,840; 12, \$2,725; 27, \$3,000; 34, \$2,515; 39, \$2,965.

Item 36, one cylinder grinder—Bid 7, \$2,095; 35, \$2,195; 39, \$2,144.

Item 37, one universal cutter, tool and reamer grinder—Bid 7, \$665.40; 9, \$570, \$645, and \$899; 12, \$660 and \$852; 34, \$1,076; 36, \$1,112; 37, \$500 and \$450; 38 \$465; 39, \$770.

Item 38, one 16-in. universal shaping machine—Bid 7, \$1,032.88; 12, \$1,305; 23, \$1,035; 37, \$769; 39, \$1,105.

Item 39, one vertical 36-in. turret lathe—Bid 7, \$6,090; 12, \$5,700 and \$5,750; 34, \$2,530; 38, \$2,616.

Item 40, one high-speed shaft-driven upright drilling machine—Bid 7, \$1,165; 8, \$421 and \$586; 12, \$492; 34, \$667 and \$582; 35, \$418; 37, \$438 and \$810; 39, \$1,165.

Item 41, one radial drilling machine—Bid 7, \$2,588; 12, \$1,990; 37, \$1,863; 38, \$4,400; 39, \$2,815.

Item 42, one high-speed ball-bearing sensitive drilling machine—Bid 7, \$288; 8, \$281; 9, \$177; 34, \$247; 35, \$252 and 236; 37, \$245; 38, \$215; 39, \$160.

Item 43, one 6½-in. vertical shaping machine—Bid 6, \$1,179; 39, \$373.

Item 44, one bench lathe—Bid 6, \$2,070; 38, \$689; 39 \$1,460.

Item 45, one toolmaker's lathe—Bid 6, \$995; 8, \$1,768.25; 39, \$965.

Item 46, one 14 x 18 ft. lathe—Bid 6, \$2,273; 8, \$2,682; 39, \$2,350.

Bids were received by the Bureau of Supplies and Accounts, Navy Department, Washington, March 27, for supplies for the navy yards, as follows:

Schedule 807, Yards and Docks, Class 132, Portsmouth—One locomotive crane—Bid 21, \$12,863; 30, \$13,280; 88, \$13,175; 103, \$11,520.

Schedule 813 Steam Engineering, Class 181, Charleston—One electric welding and cutting outfit—Bid 50, \$3,860; 106, \$2,400; 127, \$2,800; 203, 1,655; 205, \$3,375.50.

The names of the bidders and the numbers under which they are designated in the above lists, are as follows:

Bid 2, Mott Sand Blast Mfg. Company; 4, Chas. H. Besly Company; 6, Pratt & Whitney Company; 7, Henry Prentiss & Co.; 8, Sherritt & Stoer Company; 9, Knickerbocker Supply Company; 12, Niles-Bement-Pond Company; 13, Davis-Bournonville Company; 16, Becker Milling Machine Company; 17, Prest-o-lite Company; 18, American Foundry Equipment Company; 20, Pettingell Machine Company; 23, Potter & Johnston Machine Company; 27, Carroll Electric Company; 28, Barber & Ross; 32, Oxweld-Acetylene Company; 33, Alex. Milburn Company; 34, Swind Machinery Company; 35, Fairbanks Company; 36, Brown & Sharpe Mfg. Company; 37, D. Nast Machinery Company; 38, Manning, Maxwell & Moore, Inc.; 39, Kemp Machinery Company; 50, C. & C. Electric Mfg. Company; 89, Industrial Works; 103, Link Belt Company; 106, Lincoln Electric Company; 127, National Electric Welder Company; 203, Westinghouse Electric & Mfg. Company; 205, Wilson Welder & Metals Company.

NEW TRADE PUBLICATIONS

Grab Buckets and Cranes.—Whiting Foundry Equipment Company, Harvey, Ill. Two catalogs. The first, No. 126, superseding No. 104, contains a concise presentation of the advantages, construction and operation of the Watters grab bucket for which the feature of instant detachability as compared with the ordinary clam shell and other types of buckets is particularly emphasized. A number of views of the bucket in use are included. The other, No. 127, superseding No. 110, describes and illustrates an extensive line of cranes. These include electric and gantry traveling cranes, locomotive and coach hoists, power travelers, jib and transfer cranes, etc. The illustrations and the descriptive matter pertaining to the various types are supplemented by a number of views of actual installations in connection with which a brief mention is made of the special features and the place where it is installed.

Vertical Drilling Machines.—Cincinnati Pulley Machinery Company, Inc., Cincinnati. Circular. Concerned with a line of heavy-duty, ball bearing, vertical drilling machines that are built in combinations of from one to six spindles with plain hand or with power feed. General specifications and a brief description of the machine are presented and a number of engravings of the various styles that can be supplied are included. An illustrated description of one of the machines equipped with a round swinging table and a flat working base appeared in THE IRON AGE, Oct. 12, 1916.

Wire Glass.—Pennsylvania Wire Glass Company, Pennsylvania Building, Philadelphia. Pamphlet entitled "Wire Glass and Why." Gives briefly the reasons why wire glass should be employed from the standpoints of retarding fire, freedom from splintering, economy of installation and reduction of insurance rates. These features are elaborated upon in the pamphlet and a number of illustrations of places where the glass has been installed are included. A suggested specification and list of the various grades to be used for different purposes are given.

Industrial Trucks.—Stuebing Truck Company, 308 Walnut Street, Cincinnati. Relates to a lift truck for inside trucking in industrial plants. The load is raised by pulling the guiding handle down from a vertical position. The construction of the truck, which was illustrated in THE IRON AGE, Sept. 23, 1915, is gone into at some length and a number of views of the trucks in use in industrial establishments are included.

Foundry Equipment.—Northern Engineering Works, Detroit. Catalog No. 96. Deals with an extensive line of foundry equipment which includes cranes, cupolas, hoists, etc. The Newton cupola is featured, a number of views of its construction and installations of it being included. Other equipment, such as ladles, cars of various kinds, tumbling barrels, elevators, hoists and cranes, is illustrated and briefly described, and in a number of cases tables of the various sizes that can be supplied are included.

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